"FOR THE SPECIALIZED COMMUNICATION RADIO AMATEUR"

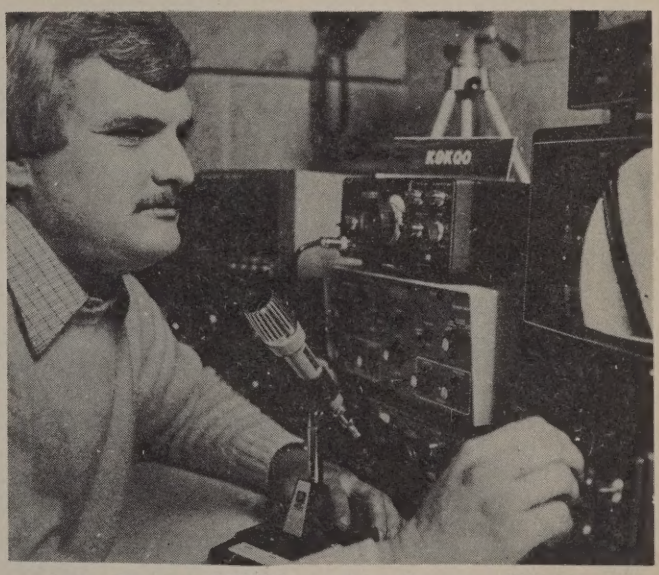
AMATEUR TELEVISION MAGAZINE™

JUNE 1982 VOLUME 12 NO. 6 PUBLISHED MONTHLY "OUR 15TH YEAR" $2.00

ATV MODES SHOW TREMENDOUS GROWTH!

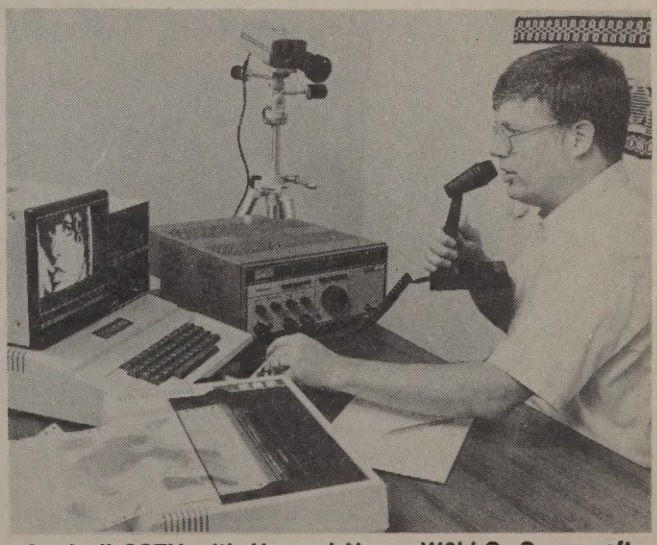
A5 MAGAZINE SUPPORTS ARRL/FCC 82-83

KA6HXX and family FSTV "Mobile"

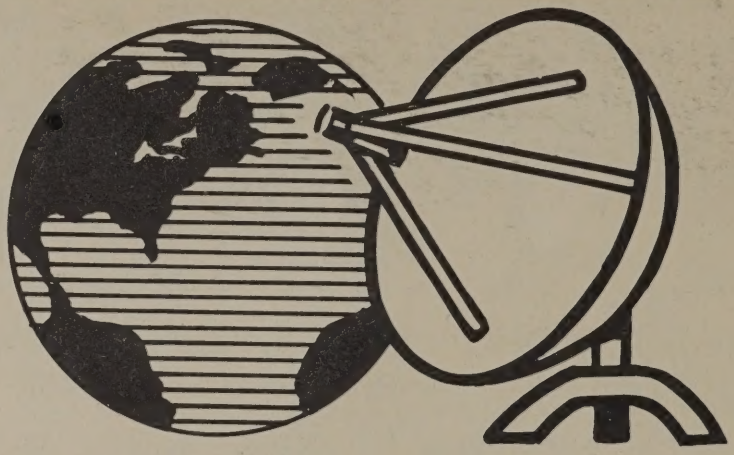


Larry Benson K9KQO receives Voyager pictures

- A5 at National ARRL Convention
- Helpful Hints For FSTV Operation
- Evolution of TV
- Jerrold TV Channel Data
- ATV Activity Report
- USA FSTV Repeater Directory!
- TVG-23 2300 Mhz. Test Generator
- Dayton ATV Report-Part One!
- New ATV Book Released
- TVRO-Part 4
- FCC 82-83
- SSTV DX July Contest Rules!
- Commsoft Apple II Program
- FACSIMILE by Bob Roehrig
- Questions about RTTY
- And Much More



Apple II SSTV with Howard Nurse W6LLO. Commsoft Corporation-Photo by Tim Davis



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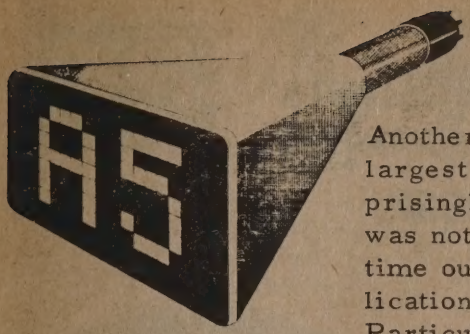

Publisher's Foreword

MIKE STONE WB@QCD

Another Dayton Hamvention is over. My fifth year at "the world's largest hamfest" which had an estimated 28,000 attending and surprisingly, with the warm spring weather all 3-days, the crowding was not too bad inside the main buildings with many spending more time out in the flea-market areas. A5 Magazine is the "first" publication to give you the reader details of just what went on at Dayton. Particularly interested in the ATV modes, so much went on that we will give it to you in two-parts. The "first" report is in this issue with the second coming with our "July" issue. It was interesting to note on the May 6th "Thursday night technical? SSTV Net on 14.230 Mhz., that a St. Louis station (who did attend the affair) and "Net Control" put out the word that only "two" color systems were at Dayton with nobody showing a "8-second one frame color picture. KB8LU Ron Flynn (covering the convention for World-Radio News) quickly "broke-in" to correct the statements. There were actually 5 SSTV color systems at Dayton; KW Control with the SC422A (Volker Wraase unit), Interface Systems (Robot 400 modification), Sycel Communications (Colorscan 403-See our May issue), Apple II Color by Commsoft Corp. and Don Miller's "prototype" experimental 1-frame 8 second, full-color Scanconverter. Syd Horne's "Colorscan System" was demonstrated at the Friday night SSTV get-together with immediate after-session "buyers" for the new unit. Don Miller's 1-frame color system "stole the show" and drew many onlookers. Miller and George Steber along with Robert Suding are all "working" towards the one frame color display system. Color SSTV really wasn't the big highlight this year at Dayton as up to 64 grey levels and "high-resolution" were displayed with fantastic resolution pictures. For someone to say that there wasn't much this year at Dayton-makes one to believe "self-interest" is again at work which is getting to be very apparent these days on the SSTV frequencies. A supposed "get-together" to discuss the proposed "General SSTV" operating frequencies now legal on the HF bands (80-252) never materialized. Neither did the outlining of the "2nd attempt" to establish an international SSTV society as promised in CQ Magazine's May issue. (The founder's are probably too busy selling "books" and "boards".) One great bit of "news' was that rumor has it that Don Miller W9NTP is going to run again for ARRL 9th District Director this fall. A5 Magazine strongly "supports" Don's venture and you'll be hearing more about it in later months. Our congratulations to Ken Kucera KAØY for his EME front cover picture on the May issue of QST (See A5 Magazine Sep/Oct 81 article). The UHF ATV bands are beginning to "open" with the 7.290 Mhz. 40 Meter FSTV Net conducted by W9ZIH growing in regular check-in stations each Saturday morning (11 am CDT). The upcoming FSTV Contest in August should be very exciting as video-nuts from all over the country get on-the-air for DX'ing. The "New ATV Book" is printed and currently being mailed to those of you who "reserved copies". If you don't receive yours right away, be patient. Three "mailing periods" are in effect (bulk mailings save costs) with the last shipment to be made by the end of May. The new book ended up at 112 pages and 13 chapters loaded with "goodies" including a 1982 FSTV Activity and Repeater Directory. (We are putting together a similar book for SSTV which should be out in the fall.) My apologies to Syd Horne for a "crummy" representation of his fine color-sstv system picture on the May issue. The printer did a bad job of blue insertion which does not truly deplict the great reds, blues and greens that Syd's system displays. An "informal" poll at the A5 booth at Dayton revealed Syd's and the German SSTV Color systems were "neck and neck" for the "best color" displayed (See our Part 2 July issue). Enjoy this issue which has a few pages from our "new" ATV book. Part 4 of Gerard Wilson's TVRO series is included with some new areas covered by Commsoft for the Apple computer and Facsimile by Bob Roehrig (look at the JA-fax picture!) -QCD

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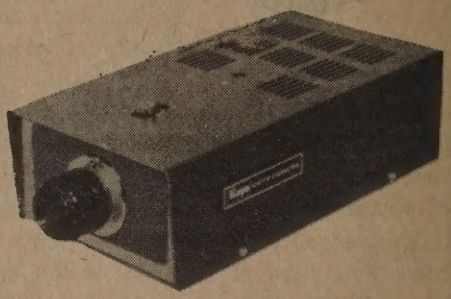

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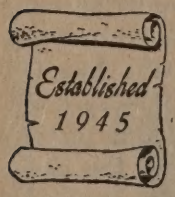

"We support Amateur Television
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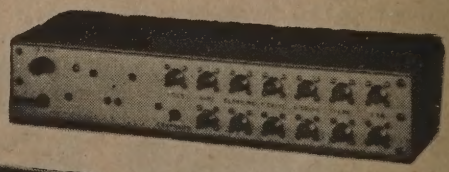
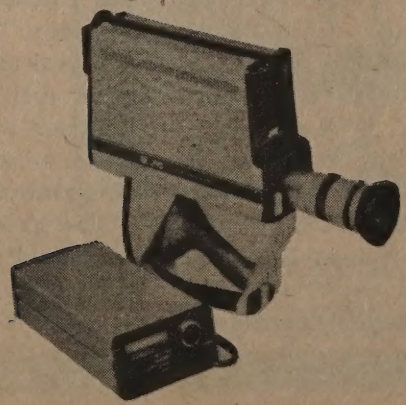




A5 World News Roundup

JPL ARC BOARD FOR 1982

W6VIO Amateur Radio Club held Board elections for 1982 with the following results; (left to right) John Mc Kinney-President, Merv MacMedan-Emergency Com munications Manager, Jay Holladay-Trustee, Stan Sander-Director at Large, John Earnest-Secretary & John Repar-Treasurer. Art Zygielbaum-Vice President is not pictured. (Photo by Norm Chalfin K6PGX) The world famous Club is putting up the final touches on the commemorative QSL cards for those of you who worked them during the Voyager II Saturn encounter. The special event station W6VIO netted a total of over 8,000 contacts on all bands and many modes including FSTV and SSTV (both color). QSL Manager Bruce Beaudry WD6HEZ will be in charge of mailing all those cards. A new SSTV tape featuring the Voyager II encounter will be released later this spring for SSTV enthusiasts. The Club meets the 2nd Wednesday of each month at noon. They sponsor an open repeater (W6VIO/R) on 222.44/224.04 out with a link to WR6AZN on the Table Mountain area in California. The Club simplex frequency is 223.400 Mhz. Net at 8 on Tues.

F3YX led section A with 14,816 points, 61 qso's and a longest distance reported of 384 km. in the recent German International ATV Contest 1981! Section B 70 cm. winner was DB8JJ with 1,543 points, 29 contacts and 197 km DX. Activity is unbelievably strong in Germany on FSTV with 123 contesters reporting in section A and 24 in section B (70 cm.) and 16 section A and 3 in section B for 23 cm. Results of this contest elsewhere in this issue. "TV Amateur AGAF DARC". Further information on the German ATV Club can be addressed to A5 Representative DJ4GL.

ARRL, Newington, Connecticut (U.S. Amateurs) has a new president, General Manager and Executive Committee; Victor C. Clark W4KFC was elected President, David Sumner K1ZZ was elected General Manager with Carl Smith WØBWJ-First Vice-President, Larry Price W4RA-2nd Vice President, Gar Anderson KØGA-Vice President and Dick Baldwin now assumes the IARU Vice Presidentcy, James McCobb K1LLU-Treasurer and Dave Sumner also doubling as ARRL Secretary position holder. The new 4-member Excutive Committee is represented by the U.S. and Canada; Bill Stevens W6ZM (Pacific Division), Jay Holladay W6EJJ (Southwestern Division), Paul Grauer WØFIR (Midwest Division) and Mitch Powell VE3OT of CRRL. The ARRL General Manager Dave Sumner K1ZZ has always been very supportive of the ATV mode in the past with Henry Ruh and continues his friendship with Mike Stone WBØQCD-present editor of A5.

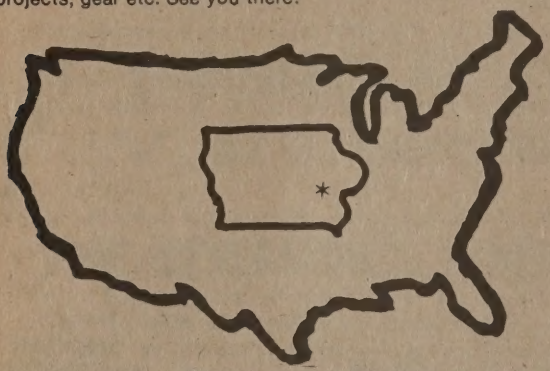
Those "Black-Boxes" reported causing interference to UHF repeater/remote base operation in Southern California (WLR 362) in the 420-450 Mhz. bands are called Syledis or Syledis L-D short to medium range radio positioning devices (transmitters) for marine activities. They are manufactured in France by a company named Sercel. Their purpose for a navigation aid to the merchant marine and oil drilling platforms, etc. is quite legal, although each unit is required to be individually licensed and operate on a secondary, non-interfering basis with all other radio activities-including Amateur Radio. The units use PSK modulation to transmit a pseudo-random code of 127 elements with .52 microsecond duration for each element. Bandwidth is approximately 1.25 Mhz. with power outputs available to 220 watts. Power levels are restricted to the 13 watt level within the continental U.S. based on a maximum of 20 watts input. There area also 1.6 Mhz. locators probably built by Odem Offshore Co. of Batton Rouge, La. Amateurs who experience interference from either unit and can prove that such units are in their area and are the cause of the intereference are advised to contact the nearest FCC office. Special thanks to W6ORG, WA2KBZ, WB6FDF, WA6MVP and others for the research efforts. -Westlink News #363

MEETINGS OF SPECIAL INTEREST GROUPS WILL BE HELD AT VARIOUS TIMES THROUGHOUT THE CONVENTION.

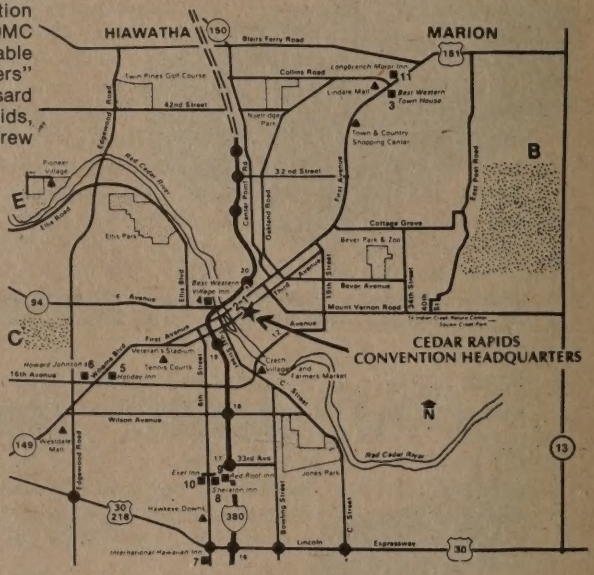
worlds largest

- ARRL Forum
- Frequency Synthesizers
- Machine Generated & Copied CW
- Art of Home Brewing Linear Amplifiers
- AMSAT Forum, Basic & Advanced (2 Parts) - 3 Hours
- Microprocessors in Amateur Radio
- State-of-the Art Receivers
- Antenna Tower Construction
- RFI/TVI Prevention & Cures
- DX-Pedition
- Contest Forum
- DX Forum
- RTTY Basics
- FM Repeaters
- Public Service
- ATV/SSTV Techniques
- HF Antennas (General)
- VHF/UHF Forum
- FCC Forum
- EME - Iowa Style
- Beginner Novice
- Aurora Borealis, KL7AM

This is the big one and A5 ATV Magazine will be there! ATV/SSTV Forum on Saturday featuring Mike Stone WB0QCD of A5 ATV Magazine, Henry Ruh KB9FO and Don Miller W9NTP. The meeting will cover FSTV demonstrations as well as W6ORG's latest videotape on ATV produced by Dave Bell and Associates. SSTV portion will cover high resolution SSTV and Color SSTV. A special Motion SSTV demonstration by KB9MC is also planned. An "A5" Hospitality Suite (open bar) will be available Saturday night at the Convention headquarters hotel "Stouffers" downtown Cedar Rapids. Make hotel reservations via ATV'er Dick Isard WB0VVZ, Cedar Valley Amateur Radio Club, Box 994, Cedar Rapids, Iowa 52406. Bring your ATV photos, videotapes, SSTV tapes, homebrew projects, gear etc. See you there!



TALK IN FREQUENCIES
146.16/76, 146.52, 223.34/94 MHZ.



"Letters To The Editor"

P.O. Box H, Lowden, Iowa 52255

"I enjoy A5 and have been subscribing for over 4 years now, but was shocked on renewel time to see the rates! Isn't there anything you can do to reduce the rates?" - WB8NNV Editor-You must not be reading my page 1 Editorials for the past several issues? A5 Magazine(as did all magazines and newspapers) sufferred two postal rate increases within the last 2 years-the most recent occurring last November. A5's prices held at $7.50 for a long time and Henry Ruh ate the extra increases before passing the magazine onto yours truly. Having got my hands on the "books" so to speak, I realized that if A5 was to survive and remain offering the kind of quality and coverage that it has in the past-a rate increase was due. We went to $10.00 per issue with the January 1982 issue. The whole printing operation was "moved" from Topeka, Kansas to Iowa saving alot of time as well as a better price on printing & mail handling services. Now that we went monthly 12 times per year you can't expect us to give you another six issues free can you? Thus, the price doubled to $20 per year & devided by 12 thats only $1.66 per issue. Keeping in mind that QST, 73, CQ and HAM RADIO enjoy thousands of subscribers which lessens cost per subscriber. It still costs X amount of dollars to print the rag, and if you have fewer subscribers to devide the cost among-a heavier toll exists. We use newsprint copy as it is the cheapest type of paper to buy (relatively speaking) and our covers are not full color like others but we try to do the best with what we have budgeted each month. The two color issues printed in May for Dayton and again in November for the annual SSTV special edition usually put me in the "red". Compared to other Amateur magazines coverage of specialized communications A5 ATV Magazine is a real bargain! "Thanks for renewing!"

"I just bought a Klitzing ATV-10 converter and have no schematics or diagrams for it. Can anyone out there help me?" -Andre LaMarre VE2AHT, 1370 Montpellier, St. Laurent, Quebec, Canada H4L-4R4.

"Just thought I would drop you a note to let you know how much I enjoy reading the "rag" now that you have taken control of the operation. I normally am a quiet person who does not speak out on many issues, but since ham radio has been so close to me for many years I would like to comment on some topics that were mentioned in the last issue; I agree 100% with your suggested bandplan for Generals and HF SSTV. Have some operators gotten so lazy that they cannot "prune" an antenna or "tune" a tuner? If our forerunners thought that way we would still be on 200 meters! I too, feel badgered by Color SSTV operators who are taking up so much time on such a small frequency for all to use. The "technical net" on 20 meters isn't technical anymore. Big $$$ speak but it is driving the newcomers off the SSTV bands. Also, how about some 15 meter SSTV, eh fellas? -(Name withheld at request) 8-in Michigan. Editor- We have received about a dozen letters on this type of problem, so your feelings are not alone. Hang in there, Dayton revealed emphasis on black and white quality and higher resolution for SSTV pictures which was refreshing to see. If 83-82 gets passed, SSTV'ers will be united in one area of the bands which will create more useable frequencies.

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ATV-1-PCB Printed circuit board only. $10.00
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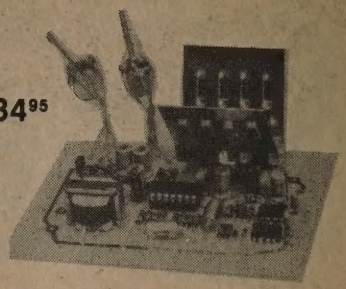

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SIL-K Complete Kit—includes a detailed instruction manual, printed circuit board and all electrical components. Kit does not include case, speaker and regulated power supply (10 to 15 volts @ 250mA).
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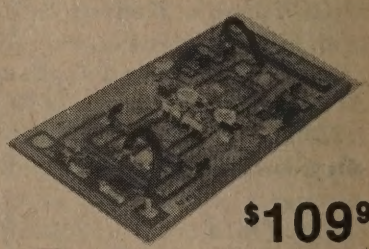
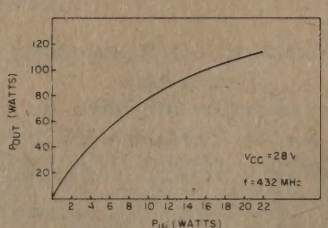
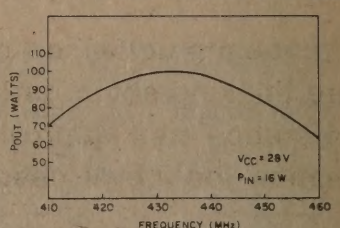


$109.95

KEB-67-PK Kit includes detailed step-by-step instructions, printed circuit board, and all electronic components as shown.
KEB-67-PCB Printed circuit board $14.00
KEB-67-I Instruction manual only. $5.00





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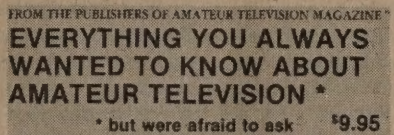
FROM THE PUBLISHERS OF A5 ATV MAGAZINE

EVERYTHING YOU ALWAYS WANTED TO KNOW ABOUT ATV* but were afraid to ask

by Mike Stone WB0QCD

"Just Released"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NEW! The most complete, easy to read, Fast Scan Television book ever assembled! 112 pages of History of Commercial and Amateur TV to video theory, construction projects, cameras, video tape recorders, antennas, etc., with Chapter 13 devoted to ATV Repeaters including an up to date 1982 USA FSTV Repeater/Activity Directory

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THE EVOLUTION OF TELEVISION

by Kenneth L. McIntosh
907 Radcliffe Road
Baltimore, MD 21204

(A5 Magazine Article March 1974 Vol. 4 No. 2)

When talking or writing about television, it seems more appropriate to say "Evolution" rather than discovery or invention. About 1900 in Newfoundland, Marconi, an experimenting inventor discovered a way to transfer signals through the air. His discovery provided a means of sending messages quite a distance without wires and was called "Wireless". These crude signals were soon changed to words and music, which was called "Radio."

Television was first just a light a mechanism added to radio. By using and expanding the circuits of radio, the peak voltages of soundwaves were amplified and wired so that ech turned the light our for an instant. The effect of lights going on and off had been produced earlier on Times Square in New York City. Anyone who watched the electric ads realized that lights and shadows form an image and by blinking create the illusion that the figures in the picture are moving. By using the same idea the early experimenters made a radio light go on and off at various locations. This made a silhouette type image which was the first picture transmitted by radio.

Sets that were made to receive these images were names "Radiovisers." The first models received the picture and that is all. If you wanted to hear sound, which was mainly to announce the picture, you needed another set. This development was called "Radiovision." Radio had listeners and radiovision had "lookers" as they were called in those days. People that had both sets received a complete program. Later both sets were combined with a switch to use them alternately. Of course, eventually the combined sets received sound and picture at the same time about the same as they do today. Pictures had been transmitted on telegraph and telephone wires, but this procedure never became popular. It was soon discontinued, and replaced by radiovision which was renamed "Television." Television continued to improve technically and increase in importance during the next 50 years.

THE FLYING SPOT

To transmit a picture by radio, it was first necessary to produce a white background. This background could be made of hundreds of little lights, any one of which could be darkened when needed. Instead of many lights, one light was used. It was viewed by looking through a tiny hole moving so fast that it looked like a streak. This illusion was first produced in 1884 by Paul Nipkow, a German, who made a small hole in a disc which passed over a lighted area. As a falling star looks like a streak across the sky the "flying spot" as it was called, looked like a streak across the lighted area where the picture was to be seen. As soon as the first spot had crossed the area, a second hole a little lower on the disc started across. To produce a lighted area about as big as a postage stamp, 24 to 60 holes were used. When the disc turned slowly across the lighted areas, the light looked like a moving spot. When the disc turned rapidly, the spot looked like a streak. When the disc spun slowly, the streaks seemed to follow each other - first across the top of the picture area - then one a little lower and so on to the bottom. When the disc spun rapidly, the streaks came so close together that the whole area seemed to be lighted. The whole lighted area could be seen through the disc at one time or that is the way it appeared to the viewer. Actually, all that was seen at one time was one tiny spot of light moving rapidly from right to left and from top to bottom. Later the tiny holes were replaced with small lens, which focused the light to create a more brilliant spot on the picture area.

The invention of the picture kinescope tube by Valdimir Zworykin in 1923 eventually brought a revolutionary change to the entire procedure. A strong electrical attraction was placed on the face of this tube. Electrons which were released by heat from the base of the tube flew to this attraction. There they struck a phosphorus coating and produced a bright spot at the point of impact. This spot was deflected slightly by placing four plates in the neck of the tube through which the electrons passed. Each plate had an attracting force that was constantly changing. One plate was on the left and pulled the electrons slightly to the left - one was on the right and pulled it to the right. At the same time one was on the top pulling it up and one was on the bottom pulling it down. By proper timing of the electrical charges on the plates, the "flying spot" was made to light the picture area on the face of thye tube in much the same manner as the scanning disc had done. Later the plates were replaced with induction coils on the outside of the tube. These produced a stronger attraction for the electron, a greater degree of deflection and made larger picture tubes possible.

THE BLINKING LIGHT

With the flying spot crossing the picture area from side to side and from top to bottom so rapidly that the whole space seemed to light up, it became necessary to have a light that could be turned on and off electrically in an instant, at any place in the picture area. No warm up time, no cooling off, no after glow could be tolerated. A neon or gas tube with a large square plate for faster action used behind the disc sets with spiral holes. Later, a tube with a small spot brilliantly lighted was usd with the lens type discs. This was called a crater tube. The first were about the size of a baseball but finally were reduced to the size of an automobile lamp bulb.

Later the use of the electron and a phosphorus coating inside the face of the picture tube eliminated the need for a separate light. But whichever system was used, the light source had to go on and off instantly at any location and produce a black dot at any point in the picture area.

A series of dots created a silhouette type picture. Still later by modifying the peak voltages in the sound waves a partial dimming of the light was possible. The fluctuating current modified the brightness in exact proportion to the light reflected on the image at the broadcasting station. This produced gray areas, shadows and permitted the showing of half tones for the first time. Eventually the use of three lights from three colors of phosphorus on the face of the picture tube - one red, one blue and one green-produced color pictures.

TOGETHERNESS

If togetherness is important anywhere, it certainly is in television. The senders equipment and the receivers equipment must do everything at exactly the same time. Close will not do - they must be exactly together. This might be easy if the sender and the receiver were in the same place, but usually they are miles apart. To overcome distance, electrical motors were used to operate the equipment. Clocks operating from the same electrical source keep exactly the same time because the motor speeds are regulated by the 60 cycle per second pulses alternating current produces. The pulses are ex-

actly the same only when the current comes from the same source. This worked very well for television in the same locality, but where the source was different from city to city one could be a fraction of a second behind or ahead of the other unless both generators were started at exactly the same instant. This seldom happened, so there had to be a means of speeding up or slowing down the motors until they were exactly together. Some models had ways to increase of decrease the amount of current by turning a knob on the set. Some used friction or cone shaped reducing pulleys to change the motor speed. Some used tuning forks to adjust the sets. These adjustments sometimes kept the viewer busy. What they needed was something that could be put into the radio wave that would affect the local set the same as the senders equipment. Eventually a series of peaks were developed that were received together with the signal that carried the program. Like the shrill whistle that only a dog can hear, these peaks affected the speed of the receiver, but never reached the listener's ears. Like a boy pushing two swings together in a playground, both at the same moment with exactly the same pressure, these peaks kept the equipment operating together. Keeping motors and moving parts exactly together is called "synchronization.'

THE SEARCH FOR SIZE

The first scanning disc sets with their tiny holes provided a picture are a scarcely an inch square. Viewing in those days was more of a peep show than anything else. Magnifying glasses were sometimes attached to the set to see this small image. First smaller ones and then quite large ones were used. Focusing the magnifying glass was a problem and sliding supports were used on some sets for that purpose. With the invention of the picture tube, greater deflection was possible and the image ranged from 3 to 7 and even ten inches by the late 40's and early 50's. Then the use of inductance coild provided 14, 17, and 19 inchmodels. This trend continued and eventually 30 inch picture tubes were produced. These were very heavy and before long picture tubes went back to 25 inches - the size that is popular today.

While the tubes were getting bigger, the body or chassis was getting smaller. Many different versions of this combination were trie. Some of the sets tapered from front towards the back. Plastic cases replaced wood to reduce size. Tin was then used to reduce the size still further. One company separated the picture tube from the body of the set and placed it on top. The floor model of this set was called the "Shaving mirror" because it was so big on top and had such a small slim body. It looked like mirrors men used for shaving in those days.

Several manufacturers tried projecting the image down into concave mirrors, which enlarged it and then projected it onto another mirror to put it right side up again. In one or two makes the second mirror reflected the picture onto an opaque glass screen about 18" square for viewing. Most of these sets looked like a massive piece of furniture which unfolded to expose the screen. The price of each was about $1,000 twenty five years ago, which is approximately the equivalent of $3,000 today. Some of these for use in taverns and auditoriums were seven feet tall. In fact several designers thought a television should look like a piece of furniture. They put doors on the front of the cabinet to hide the picture tube and control knobs. Until recently some manufacturers have combined television in console cabinets with radios and record players. In some models a tape deck is also included so you can have an input and record what you wish for later listening or viewing. For the sportsman or hunter who doesn't like the progran, there is a provision for injecting games he can play or targets at which he can shoot. This is called "Odyssey."

Every once in a while, size is forgotten and someone tries to make the smalles set they can. These produce 2½ to 4 inch pictures and use mostly transistors instead of tubes and batteries for power. They can rest on your stomach when you are lying down and were called tummy TV's. Although they are advertized as such there never has been a completely solid state all transistor TV. They all have one tube to create the picture. Maybe some day the picture tube will disappear the way the old scanning disc did and even the images and pictures will be produced without it.

RISE AND FALL OF THE AERIAL OR ANTENNA

Marconi, the man who discovered radio, was probably the first to realize the advantage of height to receive electric signals. He attached an aerial to a kite to get the wireless impulses he wanted. In the middle twenties, the usual aerial was a 50 foot wire stretched from the top of the roof to a tall tree or telephone pole. Later these were taken down and two adjustable rods called "rabbit ears" were set on top of the sets to receive the signals. Many makeshift things were tried. Some radios were even attached to bed springs for aerials. Some radio and television receivers had sliding panels in the top with a spiral coil of wire attached to them for an antenna. Even though they could be adjusted slightly, these panels did not work well. Single or double rabbit ears either separate or as a part of the set continued to be popular.

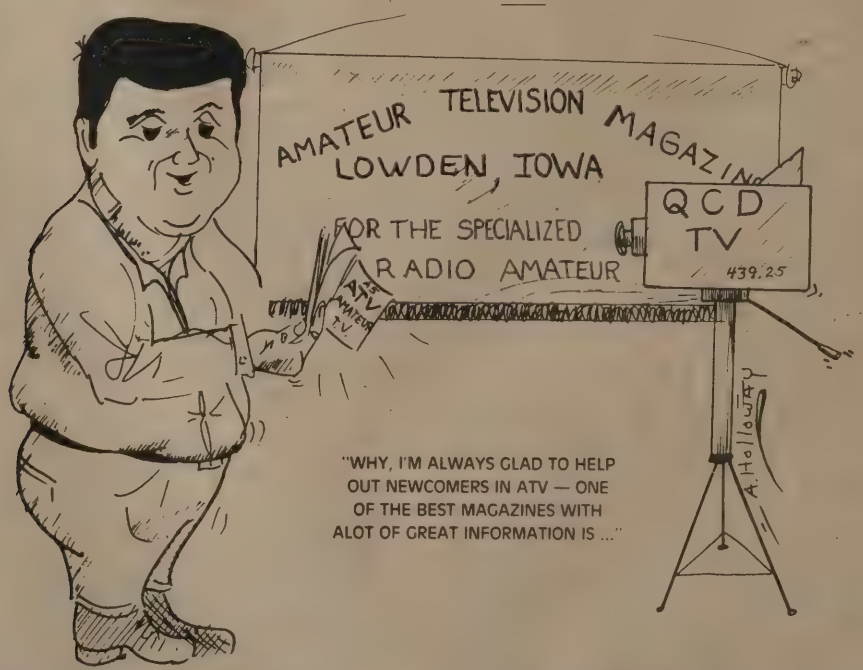
With the development of color sets the aerial or antenna usually was put up on top of the roof again. This time they were composed of parallel bars of various lengths to attract the different wave lengths on various channels.

When large metal surfaces are near a TV receiver, the signal or radio wave often arrives at the set twice - once direct from the broadcasting station and once reflected from the metal surface. This creates a double picture. The reflected image is called a ghost. The present trend is toward burying cables under ground to carry the programs to sets in the home. It is possible that this will eliminate ghosts and other interferences that are now experienced with the aerial or antenna no matter how high or low it is.

TRANSITION OF THE TV TUNER

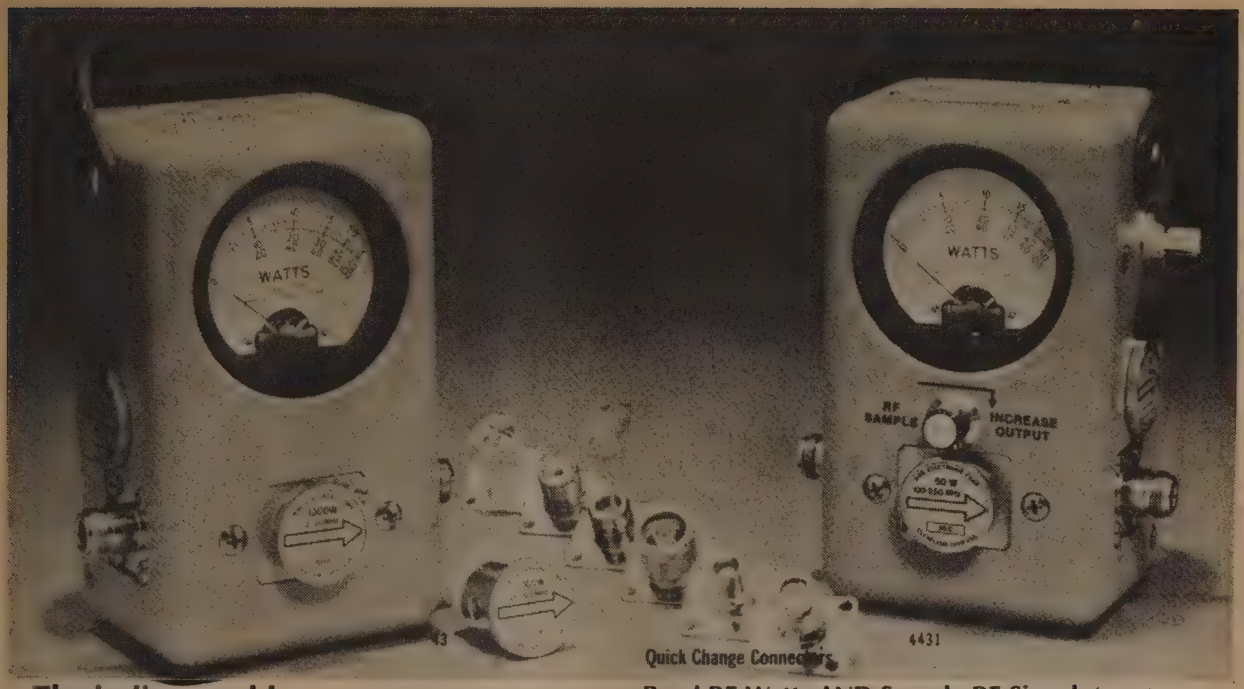
The first television sets tuned the program in about the same as radio did. A small knob turned a dial with numbers from 55 to 160 on radios and those used with radiovisors went to 300 to receive 2950 Kc. This knob changed the resonate frequency of the antenna and selected the one that picked up the program that was desired. Some times it was difficult to get the dial right on the station and slight adjustments were necessary. These adjustments were called "tuning" and the circuits involved were called tuners. Later the tuner had thirteen individual circuits, each pre-tuned to an individual channel. One of the early sets had thirteen push buttons numbered from 1 to 13. The viewer pushed the button attached to the channel he or she wanted to see. This was similar to the way some car radios work today. The push buttons soon disappeared from TV receivers and a large knob was used to turn the tuner from one channel to another. With the increase in channels from 13 to 83, two tuners were necessary. One was for the low channels - 2 through 13. Channel 1 had been discontinued for television use. These were designated very high frequency channels. The other tuner was for channels 14 through 83 which were named ultra high frequency channels. Now we have sets with remote controls and sets that tune themselves automatically.

No.	SAMS	MAKE	MODEL	TYPE	YEAR
1	-	Echophone	41	table	1931
2	48	Hallicrafter	T54	table	1948
3	54	RCA	630	table	1949
4	54	RCA	8TS30	table	1949
5	55	Motorola	VT71	table	1949
6	59	Admiral	19A1	table	1949
7	62	Pilot	TV37	table	1949
8	69	Bendix	235B1	table	1949
9	71	Motorola	VT73	Portable	1949
10	73	Sentinal	400TV	Portable	1949
11	73	Sentinal	400TVM	table	1949
12	74	RCA	8T241	table	1949
13	77	Admiral	4H1419	table	1949
14	82	Airline	84GSE30	table	1950
15	83	Motorola	7VT1	table	1950
16	90	RCA (proj)	9PC41A	Floor	1950
17	336	RCA	8PT3070	Port	1956
18	339	RCA (color	21CD8777	floor	1958
19	466	Philco	UN4432	floor	1959
20	466	Philco	UN4432	table	1959
21	550	RCA (color	212G806	floor	1961
22	681	Truetone	2DC1414	floor	1964
23	732	PHilco	UN2622	port	1965



AMATEUR RADIO TELEVISION TODAY (Editor)

Many of the same experimentors with radio and television were "Hams" and actually carried out their hobby testing under an Amateur license. It was just a matter of time before the electronic process would advance far enough for Amateurs to build inexpensive converters, receivers and video modulated transmitters sending these TV pictures across towns and counties with eventual longer distances across states with the use of very broadbanded, high-gain, multielement beam antennas. The "first" ATV Repeater was given the go ahead by the FCC after persistent efforts of Bruce J. Brown WB4YTU and the world's first Amateur Television Repeater system "WR4AAG" was on the air! A period of threatening (so called "restructuring" by the FCC) existed in 1976 entitled RM-2507 but was repealed after an organized effort by A5 Magazine and Henry Ruh of Whitmore Lake, Michigan. The rest is modern history with state of art transistorized ATV transceivers, FM sub-carrier or on-carrier sound & video special effect ID'ers and generators. The beginning of 1982 revealed the world's first all transistorized (including the tube) color camera and combination videocassette mini-recorders within a color camera unit. ATV is a commonplace mode of operation in just about every part of the country with many repeaters, groups or clubs in active operation. It started with Marconi and Radio and who knows what television will eventuallly progress into. The important thing is to be a part of it, and you can with Amateur Television!



The indispensable BIRD model 43 THRULINE® Wattmeter

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Table 1 STANDARD ELEMENTS (CATALOG NUMBERS)

Power Range	Frequency Bands (MHz) 2-30	25-60	50-125	100-250	200-500	400-1000
5 watts	—	5A	5B	5C	5D	5E
10 watts	—	10A	10B	10C	10D	10E
25 watts	—	25A	25B	25C	25D	25E
50 watts	50H	50A	50B	50C	50D	50E
100 watts	100H	100A	100B	100C	100D	100E
250 watts	250H	250A	250B	250C	250D	250E
500 watts	500H	500A	500B	500C	500D	500E
1000 watts	1000H	1000A	1000B	1000C	1000D	1000E
2500 watts	2500H					
5000 watts	5000H					

Table 2 LOW-POWER ELEMENTS

1 watt	Cat. No.	2.5 watts	Cat. No.
60-80 MHz	060-1	60-80 MHz	060-2
80-95 MHz	080-1	80-95 MHz	080-2
95-125 MHz	095-1	95-150 MHz	095-2
110-160 MHz	110-1	150-250 MHz	150-2
150-250 MHz	150-1	200-300 MHz	200-2
200-300 MHz	200-1	250-450 MHz	250-2
275-450 MHz	275-1	400-850 MHz	400-2
425-850 MHz	425-1	800-950 MHz	800-2
800-950 MHz	800-1		

Read RF Watts AND Sample RF Signals

The new THRULINE Wattmeter model 4431 offers all the power measurement functions and versatility of the model 43 (above). It also provides a variable RF signal sample for use with frequency counters, scopes, spectrum analyzers, etc. at the same time power tests are made.

The amplitude of the RF sample is adjustable between -15dB and -70dB by a control knob on the front of the wattmeter.

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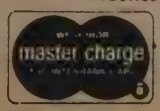

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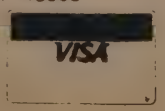

Read RF Watts AND Sample RF Signals (cont)

Max. Power Rating is 5000 watts (2-30 MHz) and 1000 watts (30-1000MHz). VSWR with RF samples -30dB or lower is 1.07. Model 4431 uses Table 1 and 2 Plug-in Elements.

QC-Quick Change Connectors avoid the use of performance degrading adaptors. Order spare QC Connectors for model 43, or 4431. These models are shipped with the N-Connector shown, unless ordered otherwise.

New: Variable RF Signal Sampler

For RF signal observation on a scope, for spectrum analysis, or for frequency counting and control.

Model 4275 produces at the BNC port an unrectified sample adjustable between 35dB to 80dB below main line signal. Usable range: 20 to 1000MHz up to 1000 watts.

Model 4273 for lower frequencies (1.5 to 35MHz) is adjustable between 40dB to 70dB below a main line maximum signal of 5000 watts.

Level settings can be locked on both samplers.

Insertion VSWR—1.1 max. 2-512MHz
1.25 max. 512-1000MHz

Connectors—QC-Type as specified (choice of connectors determines price).

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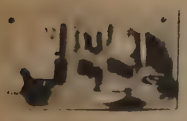
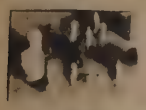
ATV KITS AND MODULES

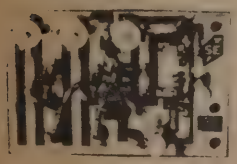


VM-2 VIDEO MODULATOR – Wideband collector video modulator for solid state exciters such as those from GLB and Hamtronics. Input for 4.5MHZ audio sub-carrier. 2½" x 1½"; **$13.95** kit, **$18.95** assembled.

A-2 4.5MHZ AUDIO SUB-CARRIER – Accepts audio from VCR or GLB audio processor to provide ATV audio on TV set. Has on-board voltage regulator and shielded inductor. 2 3/4" x 1"; **$18.95** kit, **$24.95** assembled.

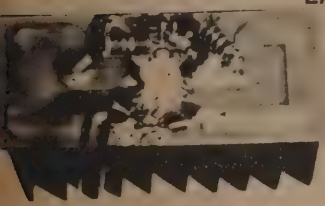


SA-1 VIDEO SYNC AMP – Provides separate video sync gain control for VM-2 above or SE-1a transceiver. Useful when driving solid state amps. 1 3/4" x 1 1/4"; **$14.95** assembled, **$11.95** kit.



DC–1 UHF CONVERTOR – Varactor tuned with 2 RF stages. MRF901 input standard. Double sided stripline design. Outputs to TV ch. 2, 3 or 4. Can be tower mounted. 11 – 14vdc. 2" x 3". $34.95 kit, **$49.95**, assembled, **$79.95** complete in box. Add **$15.00** for NE64535 1st stage.

P-1 WIDEBAND LOW NOISE UHF PREAMP – Uses MRF901 transistor to provide 16db gain and 1.7db noise figure. Covers 420–450MHZ band. Other frequencies received with change in input inductor. 2 1/4" x 1 3/8"; **$17.95** kit, **$26.95** assembled. Add $15.00 for NE64535 Option.



LA-1 UHF AMPLIFIER – Uses 15 watt MRF641 transistor with 7.8db gain @ 470MHZ. Stripline inductors with on-board pin diode antenna switching for a receiver. Designed for wideband color video with exciters such as the GLB T450L that provides up to 3 watts drive. Drilled and tapped heatsink included (4 1/2" x 1 3/4"). 1 to 3 watts drive typically gives 6 to 18 watts output. 12 – 14vdc operation @ 4 amps max. Double-sided board is 4 ½" x 2". **$69.95** assembled with test data.

LA–45 UHF AMPLIFIER – Uses MRF646. Input power of 6-15 watts typ. gives 20-50 watts output. Biased for linear operation. Kit includes all parts, instructions and 4.2" x 3" double-sided stripline board. Needs 12-14 vdc @ 9 amps max. **$59.95** kit.

GLB T450L TRANSMITTER – 4 1/2" x 2" RF board typically supplies 2–3 watts FM output, 1 – 1½ watts average video RF output. Changes for wideband video modulation provided. Comes with crystal for 439.25MHZ, with other frequencies available upon request. Also includes separate 1" x 4" audio processor board which supplies audio for FM modulation or for the A–2 4.5MHZ audio kit above. 12–14vdc @ 2 amps max. **$54.95** kit, **$74.95** assembled and tuned.

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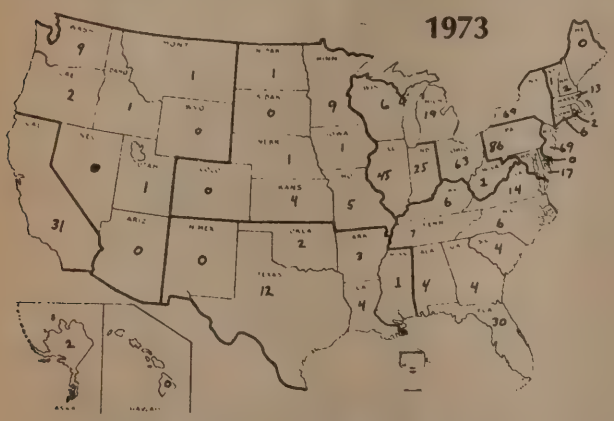
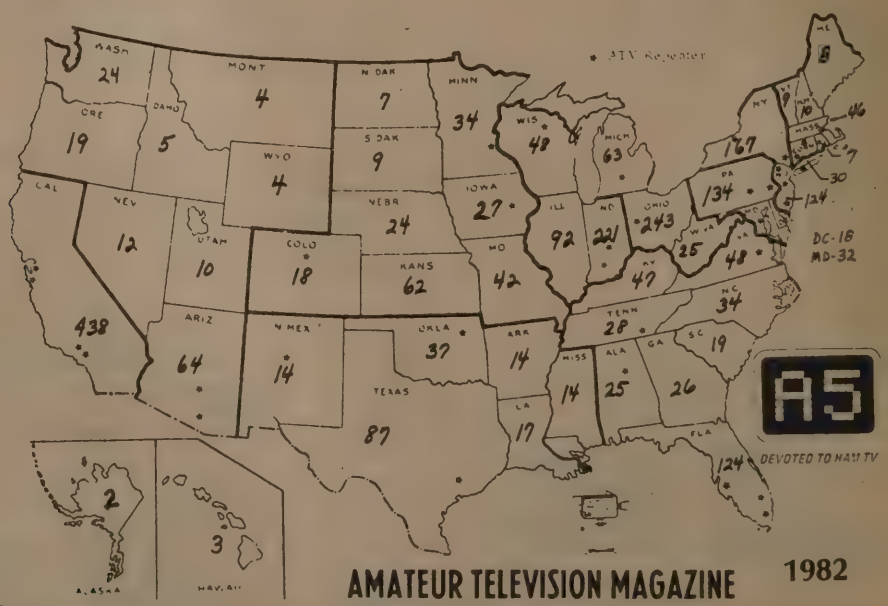
AMATEUR TELEVISION ACTIVITY
Repeaters, Clubs and Groups

Amateur Television "repeaters" have played a major role in the growth of FSTV. ATV activity varies between simplex and repeater operation, horizontal versus vertical polarization across the country. Thanks to the persistant efforts of Bruce Brown and the famous "Metrovision ATV Club," ATV saw its' first licensed FCC FSTV Repeater "WR4AAG" serving the greater Washington, D.C./Baltimore, MD. area. Today, there are over 60 known ATV relaying facilities throughout the world. The trend toward specialized communications by Amateurs along with the rapid development of the state-of-art will provide for steady growth in the ATV field. It is just a matter of time before the first "handheld ATV" units are developed providing both audio and video picture reception and transmissions. The future of ATV looks very exciting, and the thing to do is to be a part of it!

As presented below, is a study comparison of known ATV activity in the United States as published in 1973 and a look at today's ATV activity in 1982. These figures were compiled from subscription files of A5 AMATEUR TELEVISION MAGAZINE, various surveys conducted within the past two years, Club and Group activity reports, etc. This is the most accurate estimate of FSTV activity within the United States. Erors that exist will only boost the numbers per state given. It is estimated that over 3,000 Amateurs operate FSTV in the United States with perhaps 5,000 worldwide. This relates to about 1% of the total Amateur Radio population and with other modes of A5 emissions such as SSTV increases to about a 2-3% figure.



Known United States FSTV Stations April 1982
Information compiled from A5 Magazine subscription files, surveys, ATV club rosters, reporting groups, etc.



FSTV GROWTH STUDY BY A5 ATV MAGAZINE

*** Designate Known ATV Repeater Locations**

AMATEUR TELEVISION MAGAZINE **1982**

A5 ATV MAGAZINE "1982" USA FSTV REPEATER DIRECTORY
Status A — Active T — Testing

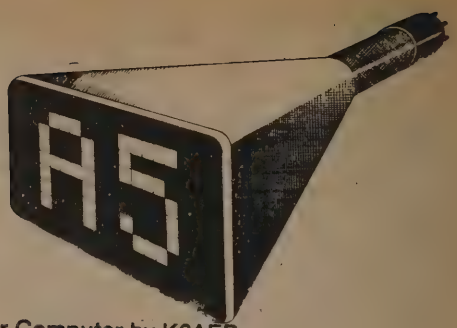
WR1AHH	Groton, Connecticut	439.25	427.25	443.75	431.75	BW	—	A	Radio Group	WA1PTS
W1NRE	New Haven, Connecticut	439.25	427.25	443.75	430.75	BW	—	A	SCARA	WA1LOU
K1BYO	Naugatuck, Connecticut	439.25	426.25	443.75	430.75	BW	—	A	K1BYD	WA1LOV
K1VTE	Malden (Boston), Mass.	439.25	434.0	—	—	BW C	180	A	Neat	W1BHD
K2PG	Iselin, New Jersey	439.25	427.25	—	—	BW	—	A	NJATV	K2M2
WR2ADD	Mount Kipp, New Jersey	439.25	526.25	443.75	430.75	BW	—	A	NJATV	K2M2
W2VDE	Warren, New Jersey	439.25	426.25	—	—	BW	—	A	NJATV	K2M2
N2BJ	Garnerville, New York	439.25	426,25	—	—	BW	—	A	—	—
WA2IUP	New York, New York	439.25	426.25	443.75	430.75	BW C	—	A	NYATV	K2M2
—	Mount Beacon, New York	439.25	426.25	—	—	BW C	—	T	Mount Beacon	WB2WLN
WB2FCN	Rochester City, New York	439.25	427.25	—	—	BW	—	A	NYATV	WB2FCN
WR2AOV	Syosset, New York	439.25	426.25	443.75	430.75	BW	—	A	NYATV	K2M2
W3WCQ	Baltimore, Maryland	439.25	426.25	—	—	BW	—	A	BATV Society	W3WCQ
WA3KXG	Harrisburg, PA	439.25	426.25	443.75	430.75	BW	—	A	CPRA	WA3AVX
K3SPI	Johnstown, PA	439.25	427.25	—	—	BW	—	A	CVARC	K3SPI
W3PHL	Philadelphia, PA	439.25	421.25	443.75	425.75	BW	—	A	PARA	K3TS
W4BJG	Birmingham, Alabama	439.25	427.25	—	—	BW	—	A	W4BJG	WA4ZVJ
W4ATD	Decatur, Georgia	439½25	427.25	—	—	BW	—	A	W4ATD	WA4ZVJ
K4OQ	Clearwater, Florida	439.25	427.25	443.75	431.75	BW	40	A	FATV	WB4BNJ
WR4AYC	Fort Lauderdale, Florida	439.25	427.75	443.75	431.75	BW	—	A	—	—
W4TOD	Orlando, Florida	439.25	427.75	443.75	431.75	BW	—	A	—	W4PLA
WR4AEE	Melbourne, Florida	439.25	425.25	—	—	BW	—	A	FRC	W4OER
WR4AAG*	Alexandria, Virginia	439.25	426.25	443.75	430.75	BW C	—	A	Metrovision	TMARC
WA420K	Chattanooga, Tenn.	439.25	427.25	443.75	431.75	BW	—	A	CURA	WA42OK
K4DTM	Greenville, Tenn.	439.25	427.25	—	—	BW	—	A	CURA	K40TM
WB5OCY	Albuquerque, N. Mexico	439.25	427.25	—	—	BW	—	A	NMATV	W5HK
K5PJR	Grove, Oklahoma	439.25	427.25	—	—	BW	—	A	ORSI	W5DFU
WA5LVT	Tulsa, Oklahoma	439.425	427.25	—	—	BW	—	A	ORSI	W5DFU
N5ABG	Beaumont, Texas	439.25	427.25	—	—	BW	—	A	N5ABG	WB5ITT
WA6RDA	Sanoma/Bay Area, Calif.	434.0	421.25	440.50	425.75	BW C	25	T	BAYREAATV	WA6RDA
WA6RDA	Sanoma (Bay Area, Calif.	434.0	1263	—	—	BW C	35	T	WA6RDA	WA6RDA
W6NFK	Mt. Diablo, Calif.	1275	434	146.43	—	BW C	—	T	BAYARGA ATV	W6NFK
W6ORG	Johnstone Peak, Calif	434.0	1265	438.0	1269.5	BW C	25	A	W6ORG	W6ORG
N6AHW	Monterey Penn. Calif.	439.25	427.25	—	—	BW	—	A	—	N6AHW
W6NFK	Oakland, Calif.	439.25	425.25	—	—	BW	—	A	ContraCostaAT	W6NFK
WA6SVT	Mt. Wilson, Calif.	434.0	1253	438.0	1257.5	BW C	25	A	SCALATV	WA6SVT
W7HLG	Tucson, Arizona	437.5	438.0	1265	1269.5	BW	30	A	—	E.K.Moore
WA7UMH	Glendale, Arizona	1253	434	147.58	—	BW	—	A	AAA5	N7AOV
WR7ALW	Alpino, Utah	439.25	427.35	—	—	BW	—	A	—	K7GRC
W8BI	Dayton, Ohio	439.25	426.25	443.75	431.75	BW C	—	A	DAytonARC	WA8MCH
W8GM	East Palestine, Ohio	434.0	421.75	—	—	BW	90	A	EPARC	KE8S
K9KTH	Bloomington, Indiana	439.75	425.25	443.75	430.25	BW C	—	A	BBSRC	K9KTH
WR9ABP	Indianapolis, Indiana	439.25	425.25	443.75	430.25	BW	—	A	IRC	W9NTP
AD9W	Wausau, Wisconsin	439.25	421.25	—	—	BW	—	A	WAR	AD9W
K0SVH	Walcott, Iowa	439.25	421.25	443.75	425.75	BW	60	T	SEIATV	WB0QCD
WA0ADA	Boulder, Colorado	439.25	421.25	443.75	425.75	BW	—	A	Rocky Mtn	WA0NHD
K0JOA	West Phoenix, Ariz.	434	2380	—	—	BW	—	T	—	K0JOA
—	Minn. St. Paul, Minn	439.25	—	147.57	—	BW	—	A	—	KK0O
—	Witchita, Kansas	436	—	—	—	BW	—	A	—	WA0NGV

KNOWN FSTV GROUPS, CLUBS, ORGANIZATIONS (NON-REPEATER)
MIDWEST AREA

Chicago, ILL	Midwest ATV	439.25	443.75	439.25	144.58	H	WA9EON
Chicago, ILL	ATV-DX'ers	436.0	443.75	436.0	144.34	H	W9Z1H
Peoria, ILL	ATV'ers	439.25	443.75	—	144.34	H	K9ILA
Canton, ILL	ATV-DX'ers	439.25	443.75	—	143.44	H	N9GA
Springfield, ILL	Downstate ATV'ers	439.25	443.75	—	144.34	H	K9KKL
Moline, ILL	Quad-City ATV'ers	439.25/436.0	443.75	439.25	144.34	H	N9AEP
Muscatine, IA	Warermelon City ATV'ers	439.25	447.75	439.25	144.34	H	WB0MEW
Cedar Rapids, IA	ATV'ers	439.25	443.75	—	146.600	V	WB0VVZ
Waterloo, IA	ATV'ers	439.25	443.75	—	146.82	H	WA0INC
Des Moines, IA	ATV'ers	439.25	443.75	—	VNK	H	K0IXR
St. Louis, MO	ATVDX'ers	439.25/436	443.75	436.0	144.150	H	WB0ZJP
Milwaukee, Wisc.	ATV'ers	439.25/436.0	443.75	436.0	144.34	H	K9KLM
Western Penn.	PADX'ers	439.25/436	443.75	436.00	144.34	H	W3POS
Waldron, Ind.	Indiana DX'ers	439.25/436	443.75	436	144.34	H	W9NTP
Minneapolis, Minn	DX'ers	439.25	443.75	439.25	147.57	H	KK0O

"WHAT HAVE YOU MISSED"?

AMATEUR TELEVISION MAGAZINE



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JULY/AUGUST 1981 (21 pages) Volume 11-4
Propagation Primer
Videotape Exchange Service
ATV Coverage Congressional Cup Race
1200 Mhz. Trash-bucket antenna
Color Video for the TX-418 Sig. Generator
ATV and Hot Air Balloonists Encounter
Dayton 81 Report
September 81 WAS/SSTV Contest
4-Pictures per Frame Robot Mod
ATV "Starter Terminology"

SEPTEMBER/OCTOBER 1981 (48 pages) Volume 11-5 (WB0QCD takeover)
A5 ATV MAGAZONE SOLD TO WB0QCD!
SCRRBA frequency Report
All About Amateur Television by KB9FO
IDS-1, VID-3 and VDM-3 circuits by W6ORG
1265 Mhz. Omni-gain Antenna
NBTV Revitalized?
The Ultimate Antenna — 48 ele. J-Beam review
Akai VP-7300 VCR Review
In Focus — (SSTV) by Bill DeWitt
SSTV UOSAT Satellite Information
CQ Moonbounce Interview with KA0Y
Getting Started on RTTY — Part One
APPLE RTTY Software
Classified Ads

NOVEMBER/DECEMBER 1981 (48 pages) Volume 11-6
Letters to the Editor/World News Roundup
Indiana ATV is Alive and Well/13 foot Earth Station Dish
Advanced Receiver Research P432VD Preamp review
Antenna Mounted Downconverter by W6ORG
W6ORG Linking for Public Events and ATV
W6VIO SSTV Pictures of Voyager Go Round the World
Last two-years of ROBOT 400 Modifications (Mini-pix)
New 3-Memory board system for Color SSTV (Robots)
A5 Magazine Achievement Awards
G3OQD Video-Light Pen Modification for ROBOTS
K6AEP — SSTV'er of Year Award 1981!
SSTV in Bits and Bytes (Micros & SSTV) K6AEP
RTTY "Ascii, Baudot and the Radio Amateur"
SCATS RTTY Art Contest

JANUARY/FEBRUARY 1982 (48 pages) Volume 12-1
Letters to the Editor/World News Roundup
History of A5 ATV Magazine
How to get Started on FSTV by W6ORG
Video Console for ATV
Silvernail Electronics DC-1 Downconverter Review
Bandpass Filter for ATV out of T44 parts
New 50 watt ATV linear with Receive Preamp
Threat to ATV Frequencies — SCRRBA
Quick Parabolic Antenna Curvature Test
New Foreign Mailing Policy Change for A5 Subscribers
44 Years Devotion to Ham Radio — Tribute to G3WW
W2GND Wins Fall 81 SSTV/WAS Contest
Having fun with SSTV by W1REQ (chess-checkers)
VE3EGO New Colorscan Converted (Adv.)
TRS-80 Color Computer by K6AEP
How to get started in RTTY with K0WVN
Classified Ads

MARCH 1982 (Monthly issues began) 40 pages) Volume 12-3
40 Meter FSTV Formed
Dayton ATV Activities
Ground Grid Linear for FSTV (T44)
Care of Transistorized Linears for ATV
New A5 ATV Book!
TVRO Part 1 of 7 by WA6RDA
FCC Adopts 80-252 SSTV/FAX for Generals!
KW/Wraase SC422A-3 Memory Color Converter Review
Robot 400 Graphic Overlay Mod KB9MC
K6AEP/TRS80C Computer - Part 2
RTTY with Joe Elliott K0WVN

APRIL 1982 (40 pages) Volume 12-4
FSTV Antenna Special Issue!
Hints for the newcomer to ATV
SCAL ATV Net Results
48 Element J-Beam Review
UHF-ATV Yagis Antenna by WA6RDA
AQ-4 Portable FSTV Antenna
Dayton Hamvention Information
1296-L4 Loop Yagis Antenna
TEM Microwave Antenna Systems
Winegard VHF-TV Monitor Antenna
W6ORG CBG-3 Color Bar Generator
AMSAT and ATV
TVRO Part 2 by WA6RDA
SSTV Mobile
Weather FAX and SSTV
W5DFU Tulsa's Weatherham
K6AEP TRS80C SSTV Hardcopy Program
Robot 400 Quad-Mod "Mod"
RTTY with Joe Elliott K0WVN
Miss February RTTY Art

May 1982 "Dayton Special Issue" (48 Pages) Volume 12-5
A5 Photo Contest
KB9FO Wins 1981 "Good Image" Award
Mobile ATV and Color Cameras
WB0ZJP Simple Homebrew ATV Preamp
Cores for ATV Sound Problems
Sync Stretcher Circuit for TXA5 by W6ORG
Lookins back at old A5's
August FSTV Contest
How A5 Magazine is put together
TVRO Part 3 by WA6RDA
International SSTV-DX Contest (July)
A5 Visits KW Control Systems
VE3EGO "Colorscan 403" SSTV System
More of Clay Abrams K6AEP
Commsoft New Apple SSTV Program!
KB9MC and Motion SSTV for Robot 400's
FAX! FAX! FAX!
VHF RTTY Group Updates
New Flesher Terminal Unit
A5 Classified Ads!

"NEW" from Tom O'Hara W6ORG

TVG-23 2300 MHZ ATV TEST GEN

The TVG-23 ATV test generator is a simple video modulated free running stripline oscillator to enable tuning up downconverters or as a QRP 2375 mHz atv transmitter. Power requirement is 11 to 18 vdc at 15 ma. Any standard video source from TV cameras, VCRs, colorbar and pattern generators, or even audio as long as it is between .5 and 2 volts peak to peak into the 75 ohm load. The 100 ohm pot adjusts the modulation level.

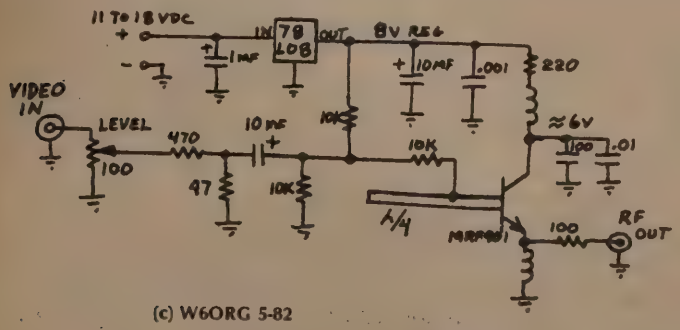
Frequency range is approximately 2100 to 2500 mHz. At microwave frequencies, it takes very little stray capacity to greatly change the frequency. Just the 10K base bias resistor lead has enough capacity to the ground plane to change the frequency as much as 80 mHz by moving it 1/8th of a inch along the base quarter wave stripline. The frequency goes up the closer it is toward the oscillator transistor. To raise the frequency higher, say to 2375 mHz in the ham band, a cut with a Exacto knife can be made at the end of the stripline .1" from the end.

If the cut has been made for the higher frequency but you want to be able to tune lower again and back, solder a small piece of teflon insulated #22 solid wire .3" long to the ground plane next to the end of the base quarter wave line. The closer the wire is to the line, the lower the frequency. The Rf output loading will also have some affect on the operating frequency, so make the adjustments after mounting in any enclosure and with the antenna or 50 ohm load connected. A quarter wave whip is only 1.1" long.

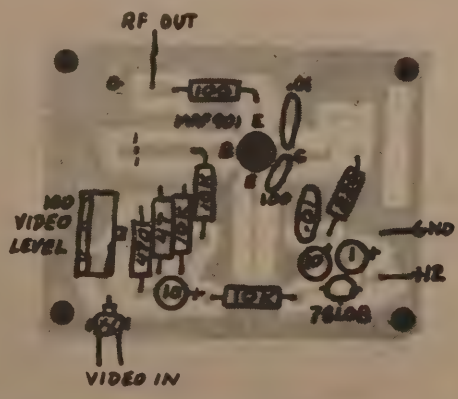
Power output is about one milliwatt which is not enough to radiate more than about 100 ft from the bench without a antenna. This is fine for rough tuning a downconverter front end. For finer adjustments, the TVG-23 should be put in a well shielded box with the power, and video input fed in with feedthru caps. The output can be a chassis connector which can go to a step attenuator to vary and drop the signal level. The power supply can be a small 12vdc unit or battery.

If a antenna is used be sure that the frequency is within the 2300 to 2450 mHz ham band to avoid the possibly of interfering with MDS transmission on 2154 mHz and other services on 2200-2300 mHz. Tune the frequency in on a downconverter of known frequency, a spectrum analyzer, or wave meter to make sure.

When tuning in the video, adjust for best picture. As with any modulated oscillator, there will be some FM with the AM which gives a negative picture on one side of the tuning. With a antenna you will also note some fluctuation as you move around the room due to multipath bounce off metal objects. (c)1982 W6ORG PC EL



(c) W6ORG 5-82



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The Basic Four Modules

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This wired and tested module is designed to drive the Motorola MHW-710 module in the PA5 10 watt linear amp. The crystal in the 100 mHz region keeps harmonics out of two meters for talk back. The video modulator is full 8 mHz for computer graphics and color. Requires 13.8 vdc reg @ 70 ma. Tuned with xtal on 439.25, 434.0, or 426.25 mHz. Built in sync expander.

Two Frequency Exciter ..... **$115 ppd**

Set-up with D1010-N 90W amp ..... add $20 ppd

2. PA5 10 WATT ATV POWER MODULE ..... **$89 ppd**

The PA5 will put out 10 watts RMS power on the sync tips when driven with 80 mw by the TXA5 exciter. 50 ohms in and out, plus bandwidth for the whole band with good linearity for color and sound. Requires 13.8 vdc regulated @ 3 amps. MHW-710-2 ..... **$60 ppd**

3. FMA5 AUDIO SUBCARRIER GENERATOR ..... **$29 ppd**

Puts audio on with your camera video just as broadcast TV does at 4.5 mHz. Puts out up to 1 v p-p to drive the TXA5 or VM-2, 3, or 4 modulators. Requires low Z mic (150 to 600 ohms), and +12 to 18 vdc @ 25 ma. Works with any xmtr with 5 mHz video bandwidth.

4. TVC-2 ATV DOWNCONVERTER ..... **$55 ppd**

Stripline MRF901 (1.7 db NF) preamp and double balanced mixer module digs out the weak ones but resists intermods and overload. Connects between uhf antenna and TV set tuned to channel 2 or 3. Varicap tunes 420 to 450 mHz. Requires +12 to 18 vdc @ 20 ma.

Super sensitive TVC-2L with NE64535 preamp (.9db NF) stage . . . **$69 ppd**

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This is a packaged version of the TVC-2 converter with internal power supply. Has BNC input and F output connectors.

Also available with the NE64535 (TVC-4L) ..... **$105 ppd**

Size: 5 1/4 X 2½ X 7 inches.

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TXA5, PA5, FMA5, and TVC basic module package ..... $249 ppd

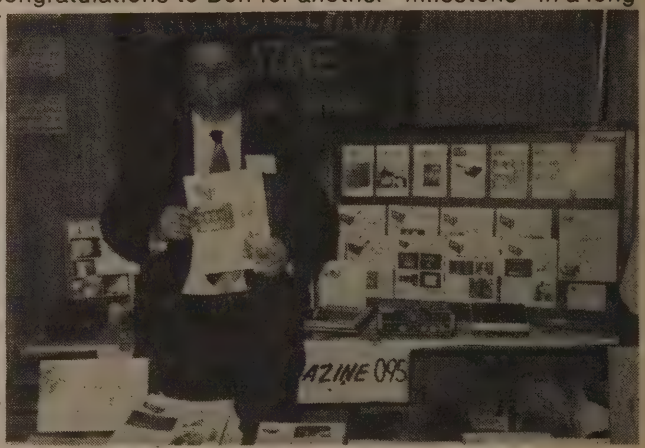
OPTIONS: 2 frequency exciter ..... add **$26**
NE64535 low noise downconverter ..... add **$15**
Packaged TVC-4 downconverter ..... add **$34**
Magnacraft W120X-14 coax relay ..... add **$41**

10% discount on 5 or more of one module ordered at one time to one address.

5-82

ATV MAGAZINE "SPECIAL DAYTON REPORT" PART ONE

This year's April 23, 24 and 25th DAYTON OHIO HAMVENTION lived up to it's well known reputation as the worlds largest t hamfest." There was so much going on in the Amateur Television field even, it is going to take two part reports to tell you all about it. Part 2 will be in the July issue. Aside from the thousands of "hams" from all over the world that attended, restaurants filled with "handie-talkie" coffee-clutching customers, the "flea market" area that just never seems to end, DX, RTTY, FCC, AMSAT, ARRL, Wayne Green, and dozens of forums that were held in the large meeting rooms and 3 "basketball" size type complexes holding the commercial exhibitors-one had to "hurry" just to keep up with what was going on with the A5 modes of Amateur Television. The "Biggest" shocker that seemed to draw the most attention was Don Miller's (W9NTP) 1-frame 8 second Color SSTV display complete with hard wired prototype converter, color monitor and alot of beautiful color SSTV pictures all painting down in RGB colors of the ranbow. Remember it was Don Miller just a few years ago that developed the two-memory Color SSTV system boards for the Robot 400 units (that few appreciated) to give the Amateur a cheaper way of producing color with existing equipment. Looking back at that January issue of QST not long ago displaying Don and Jeremy's (G3NOX) first successful transatlantic color-SSTV, reminds us all that things ar moving at a very fast pace in progress. Don mentioned that this display of one-frame color is by no means the final product, but merely a method to solving the problem of very high costs in color SSTV in one-third the transmission time. Just the fact of "seeing" it there in front of you, working and displaying great color pictures was worth the long trip itself. Don assures me that A5 Magazine will get all the details and pictures within the next few issues. Our congratulations to Don for another "milestone" in a long line of fine accomplishments in Amateur Radio. Our A5 Magazine Booth No. 95 was quite busy all 3 days selling subs. and the "new" ATV book that just came off the press as we left for Dayton. It was great meeting all of you and if we did miss you while out roaming around on Sunday we apologize and will look for you again next year or at any one of the several still to come 1982 midwest hamfests. 140 "new" subscribers helped pay for the trip with over 300 books sold in the first couple days. In the hurry of last minute printing and assembly, some of the new FSTV manuals had a few pages that were not cut properly. If you have one of these, use a letter opener to slice them open and not your fingers for a nicer tear. We had some last minute problems at our printers as Rosie and the kids sat outside in the packed car awaiting to get the trip going. the new ATV book was on the plates ready for the presses to run when a computer broke down that was doing a last minute typesetting job on the index tab placing the page numbers of all the chapters. The computer could not be fixed at that time and the decision was made to do the numbers by a regular ole' typewriter to get the product done and delivered at Dayton as I promised. (Thus the funny looking page numbers on the Index Page 2). Only 500 were then actually printed (the 78 Ford could hold no more.) and along with the May issue, wife, kids, a vast array of suitcases and other material, the trip began on what turned out as usual to be a very tiring but rewarding and exciting trip to Dayton. I hollared on all the "known" ATV secondary 2 meter frequencies as we traveled from Iowa thru Illinois and Indiana and into Ohio. Chicago is on 144.34 Mhz. FM but couldn't raise anyone at 3 p.m. and not until Lima, Ohio did I finally make contact with FSTV'ers. By the time I reached Dayton I knew the 147.450 Mhz. FM Auxillary input to the W8BI ATV Repeater and called CQ-ATV a couple times around 10:30 p.m. with WA8MCH Steve and a couple others responding. (Any station that comes on 147.450 gets repeated out in the audio subcarrier of the FSTV output at 439.25 mhz. video carrier.) This is a great way for newcomers to get interested as they can "see" the repeaters video on their downconverter system and actually talk to the ATV station at the same time. Being my fourth year at Dayton, I had always wondered where the ATV gang hung out understandably inactive at that period of time either helping out or attending the Dayton affair. Attending all the A5 mode functions and get-togethers, one thing stands out like a sore thum; There is no informal get-together of FSTV enthusiasts during the 3-day event. Imagine, here come FSTV operators from all over the world, brushing elbows at the A5, PC, Science Workshop, Aptron, Communication Concepts booths-sitting together at the Saturday afternoon ATV forumns on FSTV and SSTV, but leaving without meeting each other or having the chance to tell what their group is doing or to hear what others have done to solve certain problems. A quick discussion with Tom O'hara W6ORG on this matter brought the committment to perhaps a special FSTV forum (longer than the scheduled half-hour period that now exists) and certainly a FSTV "hospitality" suite at one of the hotels. (Yes, even SSTV'ers would be invited!) So, gripe no more--it will be done at the 1983 Dayton Hamvention. Watch for complete details in A5 Magazine. A most interesting Friday night get-together (SSTV) was held at the Holiday Inn North with moderator Robert Suding W0LMD. First on the program was Jim



WB0QCD At A5 Magazine Booth No. 95

Schueckler on Digital SSTV. Jims "boy and dog" SSTV picture is famous all over the world and is a great sampling of the much improved method of digitizing the SSTV picture elements, enhancing the image with many more grey-levels and adding a vast number of special effect functions. Jim did his college thesis on SSTV (copies available) and demonstrated to the crowd Friday night that quality black and white "high resolution" is certainly the sought after trend of the future. The trend toward "high resolution" is certainly the sought after trend of the future. The trend toward "high resolution" of SSTV pictures in all fairness has been with us for several years now. ROBOT Corp. has a whole line of commercial scan converters with 64 grey levels and 256 line resolution but the costs are so prohibitive that they are not generally known in the Amateur fraternity. Volker Wraase (DL2RZ) of West Germany has successfully market thousands of SC-421 and SC-422 scan converters (mostly in Europe) with 16 shades of grey and up to 256 pixels per line by 128 lines. His blending of memories one and two together enhance a 128 x 128 picture tremendously providing a "painting" type of picture that is yet unmatched by any other converter on the market today. It is great to see SSTV taking the direction of "quality" rather than "quantity" and what we see today is merely a drop of water behind the dam on what lies ahead for the future of SSTV operation.

Digital SSTV by Jim Schueckler

VE3EGO "Colorscan 403" Demonstrated

Syd Horne VE3EGO of Sycel Communications demonstrated his neCOLORSCAN 403 SSTV SYSTEM featuring injected color scales and a nifty "auto-servo control" for the black and white camera automatically rotating the RGB filters rapidly in front of the camera automatically rotating the RGB filters rapidly in front of the camera lense. Syd's color was nothing short of "fantastic" with an announcement of a matching color graphic keyboard system soon to be released. ((See the colorscan 403 article in the May issue of A5 ATV Magazine.) Syd also has a nice boot in the exhibition hall No. 116 with long time friend Jeremy Royale G3NOX. A formal apology was made to Syd during the afternoon ATV forum on Saturday that the front cover picture sample of VE3EGO's "Muppet's SSTV cartoon on the May issue of A5 Magazine was not reproduced properly at the printers and that the color is indeed full-color and full of brightness. Syd's unique designing of having all the components mounted easily inside the original ROBOT 400 cabinet including a new outer casing with only two wires that needed to be soldered and the rest all plug in interfaced is undoubtably the easiest and most economical way to go for the Robot 400 owner to achieve a self-built kit color SSTV system.

VE3EGO Syd Horne and G3NOX Geremy Royale

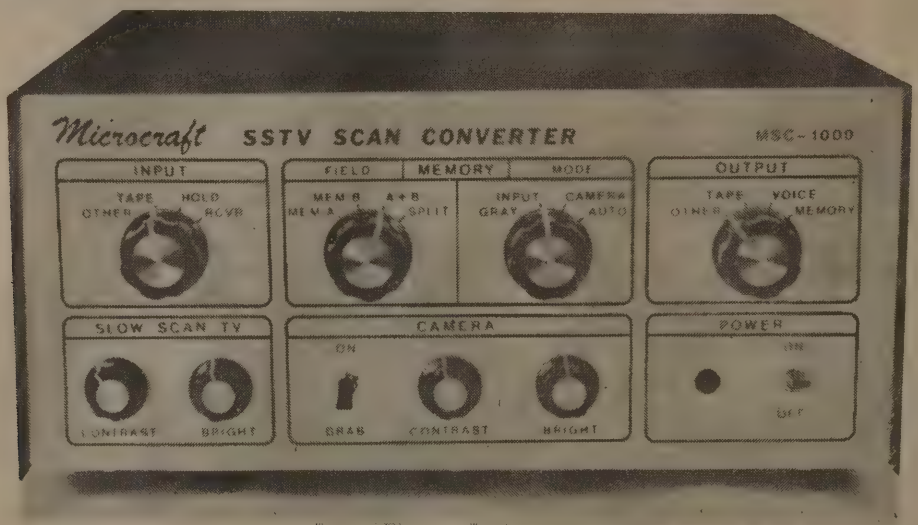
APPLE COMPUTER "Photocaster" Program by Commsoft

Apple owners were in attendance also at the Friday night SSTV Get-together to see Howard Nurse and Ken Rothmueller's new "Photocaster" program and interface module. Once again, high-resolution was the name of the game with the Apple System showing great resolution of the 16 shades of grey by either 64 x 64, 128 x 128 or 256 x 192 format "Slide Storage" technique were shown utilizing several memories along with a good color redition called "Hires" color graphics deplicting all the basic colors including some blended colors. Special effects such as zoom, quarter framing, etc. were also demonstrated along with a short course via a slide show on other things that can be done with the popular Apple II computer and one disk-drive. A unique "Silograft" feature shows the grey level placement within a stored picture. COMMSOFTS booth No. 171 was a busy place for the entire weekend.

Ken Rothmueller and Howard Nurse From Commsoft, Inc.

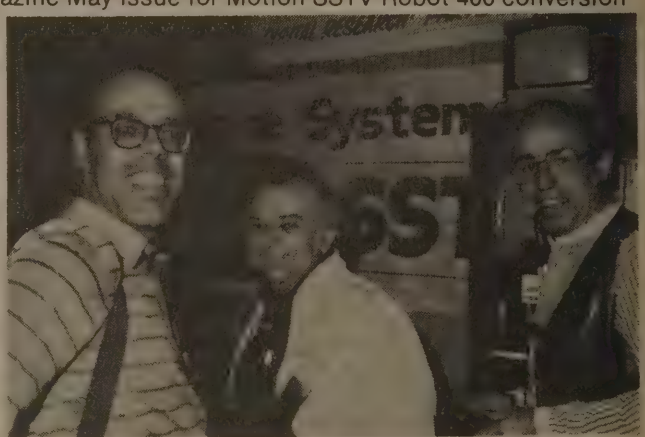
MICROCRAFT MSC-1000
SSTV High Resolution Converter

George Steber WB9LVI of (Rtty fam) Thiensville, Wisconsin premiered his "new" model MSC-1000 "high resolution" SSTV converter as the 4th guest speaker of the Friday night SSTV get-together. His professionally looking units (available in September) displayed fine quality SSTV pictures at 256 x 256 x 64 grey levels. It will be available in both kit and assembled form at $695.00 (kit) and $895.00 (assembled.) A special call letter ID prom can be included also for another $50.00. The MSC-1000 unit is selectable to standard 128 x 128 format or to higher resolution 256 x 256 mode. Two seperate pictures can be stored in the 128 x 128 format. A special split mode allows quarter framing but at a much better 128 x 128 format than now used 64 x 64 displays. Stebers unit uses 64K RAM chips for a total of 384K bits. There are many more features with the new unit and they will be covered in the upcoming annual SSTV special issue in November.



KB9MC "Motion SSTV" for ROBOT 400's

Tom Hibben KB9MC of Desoto, Wisconsin really got the SSTV crowd to laughing Friday night as he displayed several moving animated pictures with his recent conversion of the Robot 400 converter and 3-memories (WA7WOD/KD6HF design). The trend toward Motion SSTV will pick up in popularity as operators see it demonstrated. Tom's 400 unit did not look as bad as anticipated with all the modifications that he has done over the past several years. All neatly done, wirewrapped and mounted, the standard 400 unit has more little gadgets than you can shake a stick at. (see A5 Magazine May issue for Motion SSTV Robot 400 conversion details). Tom was displaying the Motion SSTV also at Sam Mormino's (WA7WOD) Interface Systems SSTV booth which drew a large gathering Friday & Saturday especially. Sam's model No. 3000C Color SSTV system was on display with a large color monitor showing great color pictures to all that walked by his booth. The model No.3000C system is for Robot 400 owners who desire to convert their one memory system into 3-memories with full color capability. Units can be purchased and installed by the customer or can be shipped down to Texas for factory installation and alignment. WB0UNB Beb from St. Louis, Missouri assisted Sam and Tom in showing the color SSTV pictures. (See NOV/DEC 81 issue of A5 Magazine for No.3000C details.)



Ron KB8LU, Sam WA7WOD and Tom KB9MC

SUDING Digital SSTV Demonstrated.

Robert Suding W0LMD (Digital Group Computers) demonstrated the final system at the Friday night get-together. His new unit will run in the $700-$750 range and is a completely micro-processor controlled SSTV system. Having had much computer experience, Robert displayed great "high resolution" SSTV pictures and special effects. The "trend" toward quality high resolution SSTV pictures is a guarantee of better things to come for the SSTV A5 mode with computers and SSTV "shaking hands" and creating some exciting digital SSTV pictures both in color and black and white.

If any of you who made it to Dayton, and missed the Friday night get-together, shame on you as you missed a very interesting evening and witnessed history in action!

Ron KB8LU, Sam WA7WOD and Tom KB9MC

WB0QCD at A5 Magazine Booth No. 95

Tom and Maryann, PC Electronics.

Murray And XYL, Science Workshop

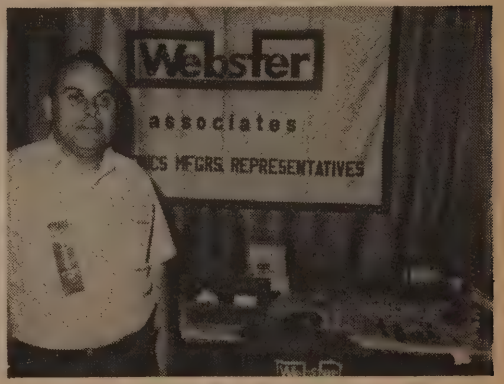
Walter and Kate Giesser, KW Control Systems

Advanced Receiver Research

Wayne Green stops by A5 Booth

Henry Ruh, KB9FO at A5 Booth

Bob Rubesh WA6ENV Robot Research



Roger at Webster Associates

A5 Magazine "JULY ISSUE" Dayton-report Part 2: Henry Ruh KB9FO wins 1981 "Good-image Award," Gerald Klatzko ZS6FD wins A5 "Golden Screwdriver Award", Jeremy Royale Wins A5 "Specialized Achievement Award," ATV/SSTV Saturday Afternoon Forum, SSTV Color Equipment Comparisons, and Much more!

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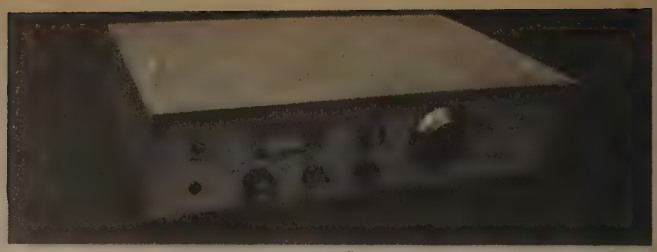

ALL ABOARD TVRO
How to Build Your Own Satellite Receiver.

ALL ABOARD TVRO
4th of a 7 part series.
DUAL CONVERSION

This has to be just about the simplest dual conversion unit around made for TVRO. This article will enable you to build a unit that will convert the 3.7-4.2 Ghz band first to 900 Mhz where both bandpass filtering and gain are provided, then convert it a second time to 70 Mhz. There are lots of ways to achieve the 70 Mhz I.F. needed, and a few of the possiblities will be discussed here. Let's look at the system as "building blocks." This way, you can substitute or build the components according to your pocketbook. Starting with the antenna side, the first "block" would be the double balanced mixer that converts 4 Ghz to 900 Mhz. The commercial unit is available from VARI-L Corp. for about $85. Other brands are available from Anzac Co., Watkins-Johnson, just to mention a few. Keep in mind that you must have a low-level mixer that requires a 7db L.O., and must have a I.F. of 1 Ghz. The DBM-500 meets all the requirements for this unit. I suppose you could fabricate a RAT-RACE mixer from PC material, but for the average builder the lack of test equipment forces us to buy one instead. Before I continue, I should point out that the bulk of your TVRO cost will be in this dual conversion unit. Some costs can be cut by as much as $100, just for homebrewing ONE item. You'll see later in this article.

The second "building block" would be the VTO. (voltage tuned oscillator). This device generates the necessary L.O. R.F. to drive the mixer. You could cut costs here if you have the ability to fabricate a variable oscillator that tunes 2.8 to 3.3. Ghz. It isn't very likely that you would want to tackle this project unless you are accustomed to working with microwaves. Therefore for the mere price of $120 you can be a proud owner of a Watkins-Johnson WJ-818 voltage controlled oscillator. A second choice would be Avantek VTO 8240. The WJ-818 however, was chosen because of its superior specs over the Avantek. Chances are the unit will be located outdoors next to the antenna, therefore the extra stable performance and stability is welcomed. Notice how the mixer and 1st L.O. are mounted together. The barrel connector is the sole support of the VTO. It puts out at least 10 dbm, which is more that enough to run the mixer. You could mount it elsewhere and run coax, but the barrel is much simpler. I used RG-188 teflon coax with SMA connectors throughout, foir ease of assembly. The DBM-500 has SMA's already, so I decided to follow with the flow, although quite a few dollars could have been saved by using other types. All SMA connectors were soldered to the PC board instead of mounting with screws, for the most obvious reasons.

The next 'block" would be the 900 Mhz bandpass and gain circuit. The six 50 pf caps are chips, and you can substitute 47 pf if you want. The piston caps are Stettner-Trush RT11302M 1.2-10pf, available from Stettner-Trush Co. 67-69 Albany St. Cazenovia N.Y. 13035. The MWA 320 amplifiers are Motorola, and supply the necessary gain for the bandpass circuit. This part of the "block" should cost around $25-$35. After the 900 Mhz is filtered, it is converted into 70 Mhz in much the same manner as before. The mixer chosen here was Mini-Circuits SBL-1X, which is capable of 1 Ghz, and requires a low level L.O. Cost is about $11 which makes it a worthwhile expense. A group of us deciding to pool our funding, was able to buy 10 of these mixers at a drastic price reduction of $6 each. TVRO is big in this part of the country! Other mixers can be used, but watch out for different pin-out that won't be the same.

The last "block" is the 970 Mhz osc. There are several paths that you can take on this one, the second being the most practicle. 1st, you could buy one (such as the Avantek VT08090), and fix the frequency to 970 Mhz., for the small sum of $120, OR you could build the one described in my article "1 Ghz OSC" which only costs about $8 and a few hours of time. This homebrew oscillator uses a MRF-901 (Motorola) and is now available at most Radio Shack chains, for under $4.

I have hand-carved half a dozen of these oscillators out of pc material with a xacto knife, and have had 100% success. This alone will save over $100. and the frequency can be set with a freq. counter pre-scaler.

Assembly & Test

Take care installing the VTO, observing correct polarity, and soldering the tab to the foil. Discard the mounting kid that comes with the device, it isn't necessary. The MWA's should have about 3 volts at the RF side of the 470 ohm resistors. Tune-up of the bandpass can be done off the air peaking each piston cap for maximum signal. The AFC voltage on the demodulator board should be shut off during this test. Of course you could sweep the bandpass and observe on a spectrum analyzer, but I don't feel that it is necessary. Be sure to solder the thru-holes around the sides of the pc board, using excess resistor leads or buss wire. Again, SMA connec-

tors are not necessary, pigtails could be used providing the center conductor lead is kept ultra-short. The next issue will be the power supply, and will complete the TVRO receiver. Consideration should be given to the box this whole project will be mounted in. I recommend that the 70 Mhz I.F., together with the items mentioned in this article, be mounted in a weather-tight box that can be mounted near the dish antenna. This will allow you to run RG-58 cable into the shack with the 70 Mhz signal, with little attenuation. Since all the modules have their own regulators, a single 24 VDC line could be run up to the box along with the VTO TUNE line, and ground. Of course you will need rotor control wire to turn the LNA from vertical to horizontal, and the RG-58, but this should be about all the wires you will need. Article 6 and 7 discuss homebrewing a GASFET LNA for a fraction of the cost, with excellent results. Again you may want to pass on this project, but there are no adjustments to make, so no special equipment is needed other than a voltmeter. Homebrew DISH antennas and feed-horns will also be discussed later down the coax.

73's Gerard Wilson WA6RDA
P.O. Box 243
Glenn Ellen, Calif.

Source: DBM-500 Varil Corp. 3883 Monaco Pkwy., Denver Co. 80207
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Stettner-Trush 67-69 Albany, Cazenovia N.Y. 13035
Mini-Circuits 2625 E. 14th St. Brooklyn N.Y. 11235
Aventek and Mini-Circuits available through:
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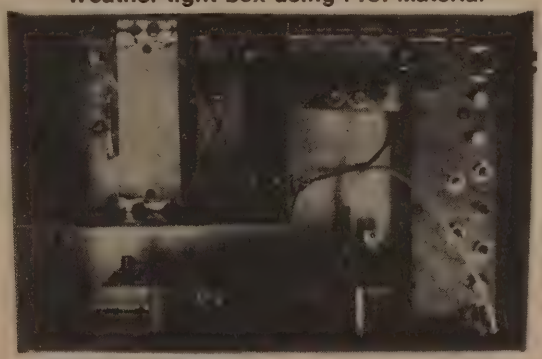
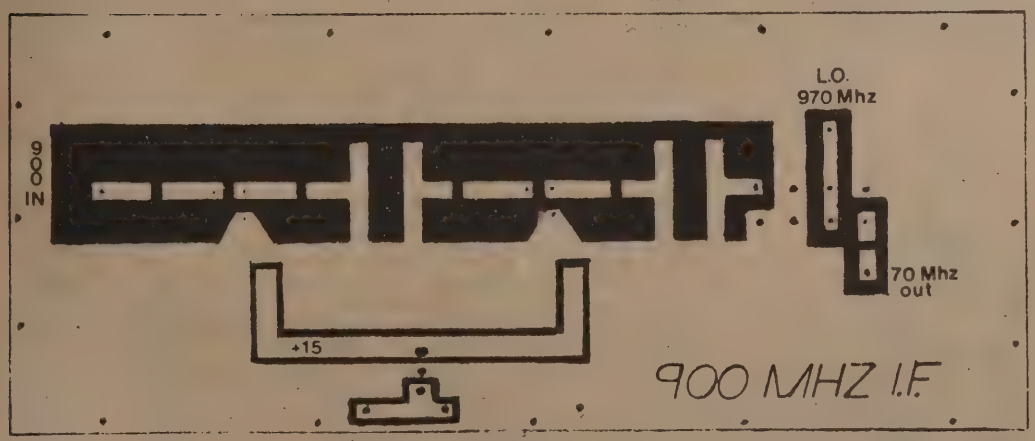
900 Mhz I.F.

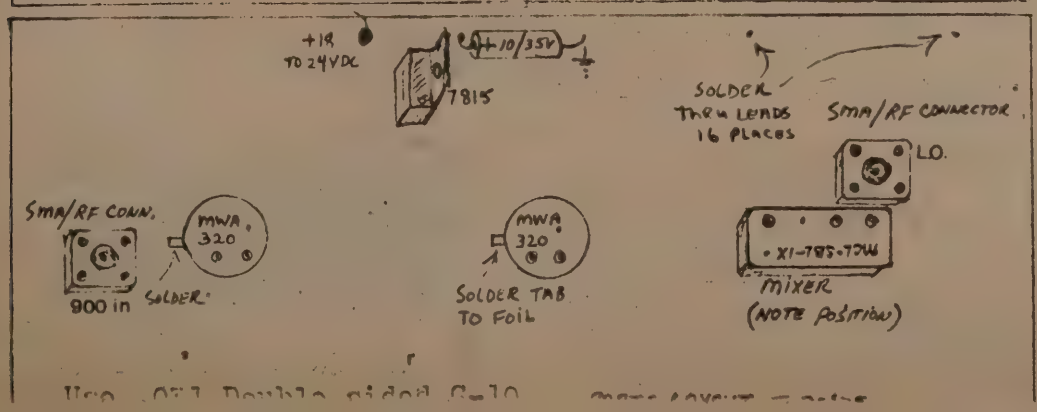
—UNDER CONSTRUCTION—
Weather-tight box using P.C. Material

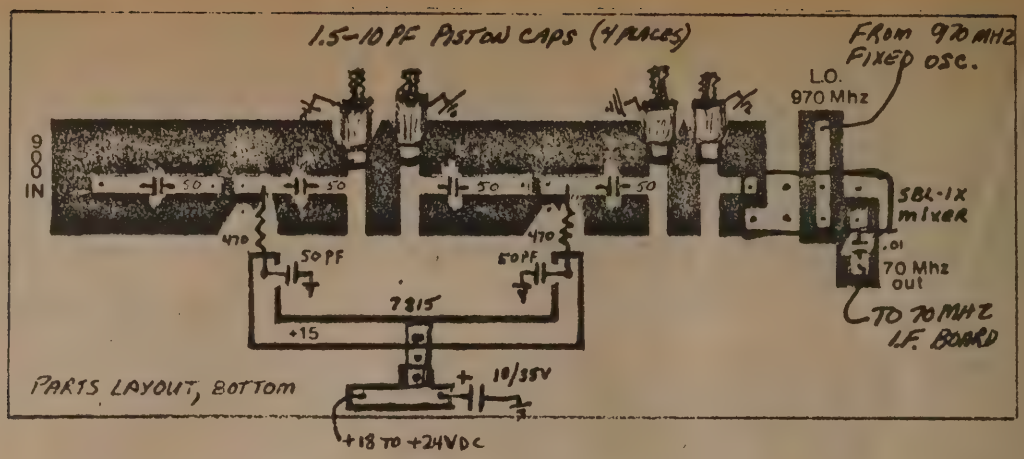


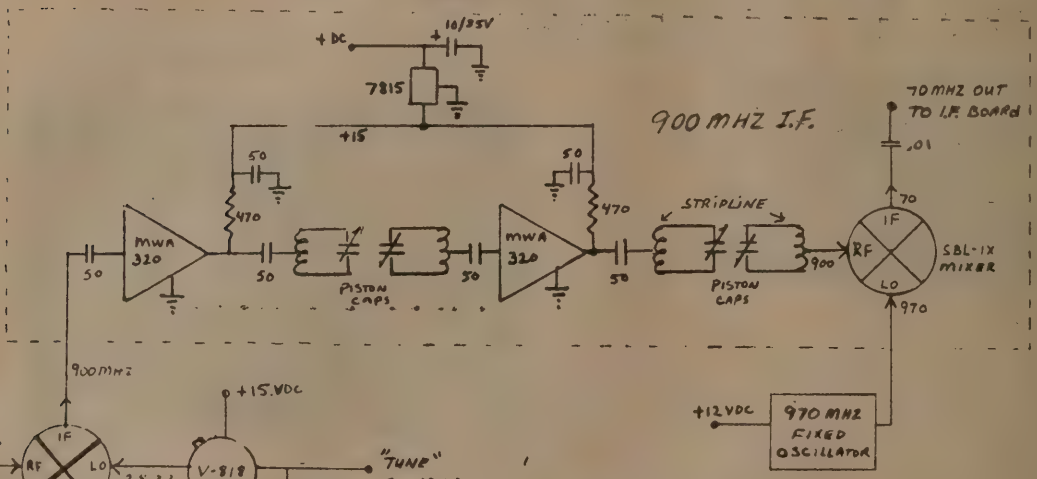
700 Mhz out

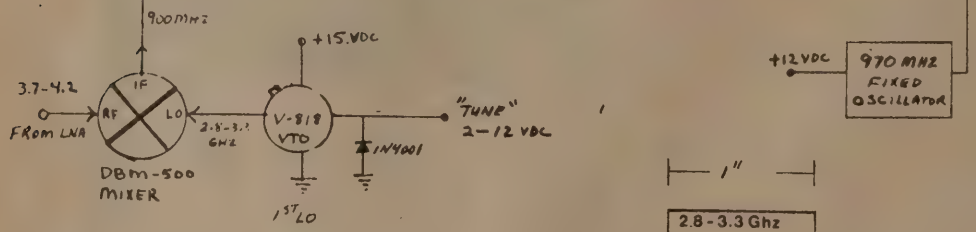
900 Mhz Bandpass I.F.

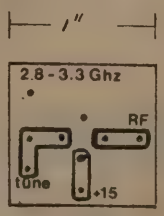




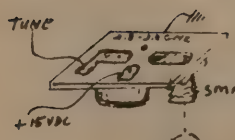


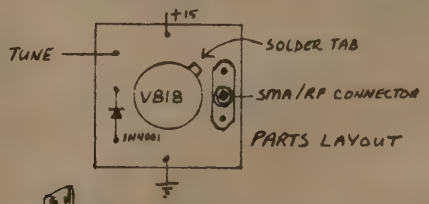


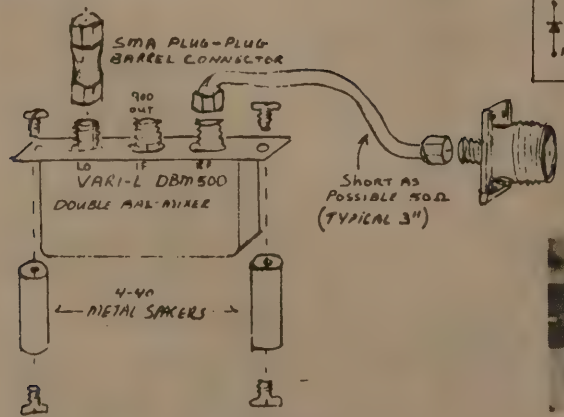




1ST L.O. PC LAYOUT (use .031) double sided





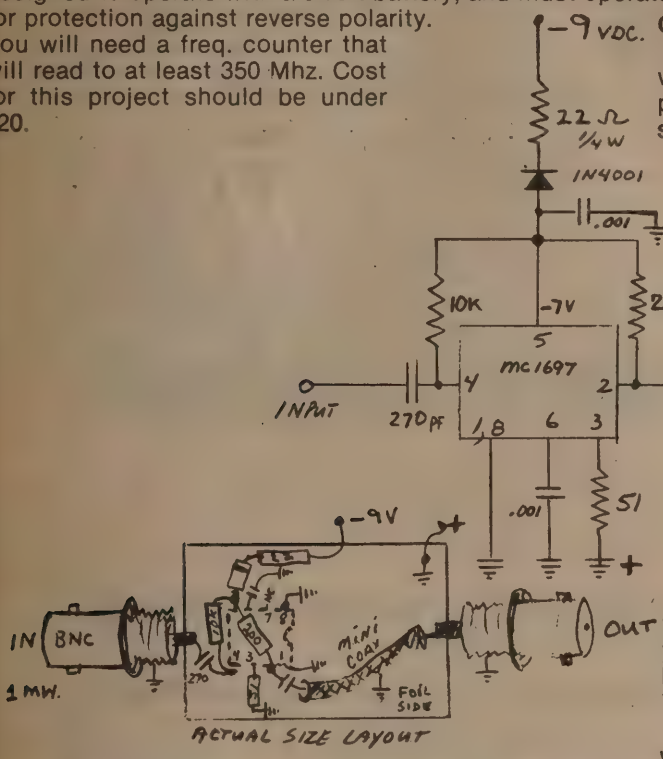


PREFERED INSTALLATION

DIVIDE-BY-FOUR PRESCALER By G. Wilson

Extend your frequency counter to 1.5 Ghz this inexpensive way, using a minimum of parts and labor.

Although the MC1697 is only rated to 1 Ghz, typical operation seems to fall between 1.4 to 1.7 Ghz, which is more than enough to cover the 1296 Mhz band. Input signal must be in the range of 200 to 1600 mv p-p for proper operation, and loose coupling or attenuators can be used to measure higher power signals. This unit was designed to operate with a 9 volt battery, and must operate with a positive ground. The diode in the supply is for protection against reverse polarity. You will need a freq. counter that will read to at least 350 Mhz. Cost for this project should be under $20.



CONSTRUCTION

A small piece of single sided PC material works well, with the IC installed on one side, and the components breadboarded on the other. Keep all leads short as possible, and mount in a shielded case.

All Resistors 1/8 watt
(1/4 watt ok)

100 Mhz should read 250

DIVIDE-BY-4

One way to cure the "math" that is required to figure out the freq., is to install or divide by four IC on your timebase crystal in the counter. This way they both are in "step." and will read correct. Try 7490. 73's, Gerard Wilson WA6RDA

Cut foil away around IC leads, except pins 1 and 8, which are ground.

RFS-10/RFS-51
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COAXIAL SWITCH
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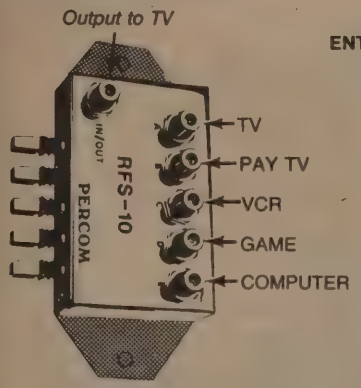
(UNUSED PORTS TERMINATED)

R.F. APPLICATION



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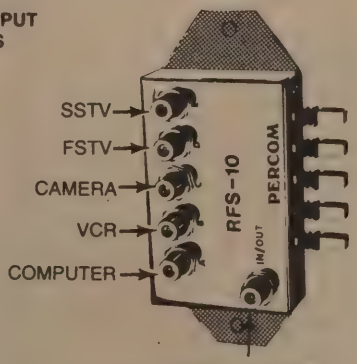
VIDEO APPLICATION



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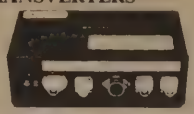

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MMT 144-28 $219.95
MMT 432-28 (S) $319.95
MMT 439-ATV $379.95
MMT 1296-144 $399.95
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MMK 1296-144, MMC 1280—ATV
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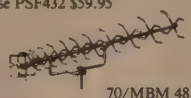

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Board No.	Description	Price
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W-3	SSTV transmit modulator	$3.00
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W-5	SSTV receive/display	$7.50
W-6	Flesher RS-232/TU-170	$2.50
W-7	Serial to parallel Epson MX-80	$6.00

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SIGNAL STRENGTH REPORTING

5 EXCELLENT
No noise visible

4 GOOD
Slight noise visible

3 FAIRLY GOOD
Noticeable Noise

2 PASSABLE
High noise level

1 LIMITED USE
Objectionable noise

0 NOT USABLE
Picture lost in noise

Amateur Television Magazine INTERNATIONAL
Mike Stone, WBØQCD P.O. Box H, Lowden, Iowa 52255

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NEW TRS-80C SSTV INTERFACE SYSTEM

A5 News Release

ANNOUNCEMENT: SSTV-IO-0100 PC BOARDS (3 BOARD SET)

Dynamic Specialities has completed the pc board design for SSTV. The set consists of 3 boards. A prototype set has been fabricated, built, and tested. Art work is currently receiving final corrections, and complete assembly documentation is being prepared. These circuits are not the simple detector circuits provided with the software. The video detector is a high linearity circuit, and the sync circuits feature noise elimination gates. The main board contains all SSTV features available with all of the current Clay Abrams software, including mixing (SSTV7.3), and also features simple switching between video and station microphone. The other two boards eliminate about 90 percent of the wiring to the front and rear panels of the box for controls and I/O. Interconnection between front and rear boards and the main board is accomplished with 6 inch dip-connector flat cables which simply plug into IC sockets on the boards. The boards have a legend showing where all resistors, capaciators, IC's, and diodes go, so assembly is very easy. The boards are top quality double sided epoxy fiberglass with plated-thru holes. The system uses 17 IC's, 3 transistors, and 15 diodes. There are 16 operational amplifiers; logic is CMOS except for the 1488 RS232 chip. Both plus and minus 10 volt supplies are on the board. A single 12 VAC transformer runs everthing. All parts are very easy to get.

The board set is $39.00 plus $1.00 for shipping and handling. California residents add 6.5 percent state and local sales tax ($2.54).

Boards will be shipped by mid April, or sooner.. You can place your order now. Your check won't be cashed until we are ready to ship.

It would be a good idea for you to order a catalog from Jameco Electronics, 1355 Shoreway Road, Belmont, CA 94002, (415) 592-8097. All of the parts on the main board are available from them as well as the cabinet and dip jumper cables. Another good catalog to get is DIGI-KEY Corp., Hiway 32 South, PO Box 677, Thief River Falls, MN 56701, 1-800-346-5144 or (218) 681-6674. Both companies are very prompt and delivery of parts is usually within a week. Front and rear panel switches, knobs, pots, meter, jacks, etc. are available from Radio Shack.

It is anticipated that the RTTY-CW interface will be available some time in June. It will have more features than the circuit provided with the software. If you build the other circuit on perf board, most of the parts will be useable on the pc boards. The price for the RTTY-CW boards will most likely be about the same as the slow scan board.

DYNAMIC SPECIALITIES
P.O. BOX 20903
SAN JOSE, CA 95160

FCC/ARRL PROPOSALS TO EXPAND AMATEUR HF BANDS
A5 ATV MAGAZINE SUPPORTS RM-3860 TO FCC

Is it really possible someday that Extra, Advance & General Class SSTV'ers could all "work" each other on one "united" calling/operating frequency? The recent expansion of FCC 80-252 for Generals to operate SSTV in the General HF "phone" bands has in reality brough very little actual contacts to date because of heavy qrm plagued phone stations also sharing the bands. The "split" still exists between SSTV'ers themselves among the various license status. This entire problem could possibly be eliminated with the FCC's new proposal of extention of the 20 meter HF Amateur band and of possible action on other Amateur bands as well. There are several proposals now before the FCC by various individuals and groups. The ARRL proposal titled RM3860 asks for expansion of the General Class phone privledges down to 14225 khz. (Among other expansions). If approved and adopted by the FCC, this could mean for the first time- a united "SSTV operating frequency area from 14225 - 14235 khz. with 14230 remaining as the "calling frequency". Such a hold by SSTV'ers from all three top license catagories could be maintained and at last all HF Amateur SSTV'ers would be able to effectively communicate together! (The present recommended top end of the band segments would then be eliminated). This "dream come true" proposal in reality means less qrm'ing by SSTV stations to "phone" stations and vice versa. A "hold" will immediately have to begin (as it has been accomplished for many years by Advance and Extra Class SSTV'ers) in the bottom segments to establish the A5 mode area quickly. Shown below, is A5 ATV Magazine's support of the ARRL RM-3860 proposal and FCC expansion of 20 meters in general. We have sent the original plus 11 copies (one to each Commissioner) as well as copies to ARRL and others. Your support of this proposal is critical! If you want this long overdue problem of SSTV interference to lessen, we urge you to take up that pen in hand and voice your support of RM-3860 in particular. Send your copies to F.C.C., Washington, D.C. -20554 (Attention: Steve Lett).

Before the
FEDERAL COMMUNICATIONS COMMISSION
Washington, D.C. 20554

In the Matter of	)	
	)	
Amendment of Part 97 of the	)	DOCKET NO. 82-83
Commission's Rules to provide	)	
additional telephony mode frequencies	)	
of the 14 Mhz. Amateur Radio band.	)	

SUPPORT OF PETITION FOR RULEMAKING

1. The Commission adopted on February 11th, 1982 and released on February 24th, 1982 a Notice of inquiry and proposed rulemaking having to do with the expansion of telephony mode privileges in the 14 Mhz. Amateur Radio band to eliviate congestion among users of said band.

2. The Commission is also looking for comments regarding additional expansion on other congested Amateur Bands between 3 and 30 Mhz.

3. A5 AMATEUR TELEVISION MAGAZINE is a monthly publication journal that began in 1967 to serve the needs and promotion of the Amateur Television mode (A5-F5) to specialized communication operators in Amateur Radio. We are international in subscribers and supporters numbering currently close to 2,000. The Magazine has presented many times "comments" and RM proposals to be considered by the Commission, most recently successful in Docket 80-252 submitted by Henry B. Ruh (former owner of A5 ATV Magazine) having to do with the addition of SSTV mode privileges to General Class operators on 15, 20, 40 and 80 Meter bands which was accepted and adopted on November 24th, 1981 and officially acted upon on February 22nd, 1982.

4. Slow-Scan Television (SSTV) has also seen tremendous growth in popularity among Amateurs which is a combination of the A5 Television (video to aural) transmission and the A3 Single-Sideband transmission for "voice" coordinating. SSTV'ers have established a long standing and strictly adhered to self-policy to keep the SSTV signals within a very small segment of the authorized mode legalized segments of the telephony band for the purpose of non-interference to other telephony stations. These "recognized" gentlemen agreements (commonly found within the self policymaking among Amateur Radio in general) have been primarily around the 14,230 Mhz. within the present "Advanced Class" Amateur Band. SSTV'ers have long desired for an SSTV "only" authorized area, but realize that such a segment would most likely create a non-telephony mode area for which the non-video voice coordination would be lost.

5. Even with the recent approval of Docket 80-252 for SSTV mode privileges in the General Class band segments, the mode is sufferring badly in establishment of a recognized calling/operating area due to the problem of crowded telephony stations trying to utilize such a small allotted operating area. An expansion of telephony privleges with the Amateur bands would certainly help eliminate some of this unwanted and interferring congestion.

6. Several proposals are before the Commission suggesting new operating areas for the expansion of telephony privleges. RM-3860 submitted by the American Radio Relay League requests that the frequencies 14150-14200 khz be added to the 14 Mhz band in Amateur Radio for telephony portions specifically; 14150 khz for Amateur Extra Class only; 14175-14225 khz for Amateur Extra and Advanced Class only; and 14225-14350 khz for Amateur Extra, Advanced and General Class only.

7. A5 ATV MAGAZINE supports this proposal by the ARRL in that such an rulemaking would establish additional "incentive" license upgrade privleges for the new segments for each license class, would greatly reduce the telephony interference problems that exist currently and would for the first time allow an area for SSTV operation by Extra, Advance and General Class operators in an already established A5 mode area (14230 khz) widely recognized by all telephony stations for television/voice operations. SSTV'ers could unite in one area of the entire band segment of 14 Mhz. utilizing an anticipated 10 hz area from 14225-14235 khz thereby freeing up other segments of the band for non-interferring SSTV operation. It is recognized that non-SSTV operation within this segment would also be allowed as would be SSTV on other telephony areas which will create no problems due to the self-policymaking agreements within the Amateur Radio society itself. Such unification is best demonstrated in the 28 Mhz Amateur band where 28080 khz is the primary operating segment for SSTV'ers allowing non-SSTV telephony stations to operate without interference throughout the entire 10 meter spectrum.

8. We encourage the Commission to adopt RM-3860 or a similar proposal granting specifically the expansion of the General Class telephony band to at least 14225 khz thereby benefitting both telephony and television stations alike.

April 10th, 1982

Respectfully submitted,

Michael W. Stone WB0QCD
Amateur Television Magazine
804 Jefferson Avenue (PO Box H),
Lowden, Iowa 52255-0408

XE1LCH WINS FEBRUARY 1982 WAS-SSTV CONTEST!

Official Results Tabulated

Top Ten Winners of
1982 A5 Magazine Worked All States SSTV Contest

Luis, XE1LCH, says this is 4A9LCH, Dog X-Ray, calling CQ during the contest.

Finished	Station	Points	Contacts	States	Mugshots	Bands Worked
1.	XE1LCH	7775	115	38	108	10-15-20
2.	N6WQ	7270	104	37	96	10-15-20
3.	K9KQO	7205	105	36	98	20
4.	KA3X	4210	40	26	46	10-20
5.	W2GND	3510	32	24	31	20-80
6.	WD9IPX	3100	39	19	36	10-15-20-40
7.	WB1ARX	2965	31	19	29	10-15-20
8.	KBØWG	2300	20	16	18	10-15-20
9.	W8FW*	2255	25	14	23	10-15-20
10.	WB6FBI	1185	11	8	7	10-20

*W9FW took 1st Place in the Multi-operator position (57 entries were received)

"Contest Comments" (A few of many)

'We put together a SSTV special station just for the contest which consisted of a ROBOT 400 and a SONY Color Camera/VTR unit. None of us had any prior SSTV operating experience to speak of and we had a "ball"! I think we really stirred up some interest here within the Club. Can't wait till next year!" -N8CLA Doug Wales, Troy, Ohio

'Wish we could limit power to 300 watts output instead of 1,000. It would make things easier for us on 20 meters against "the big-boys". Please be more clear on the "bonus points" next contest. Credits should also be allowed for working the same SSTV stations on another band. Great contest, thanks for the fun!" -KBØWG

'The established 25 points for each contact, regardless of "new state" or not was not very clear. A5 Editor corrected all logs on this-QCD). One-way SSTV qsos should have some points with 2-way SSTV worth more points. This would be ideal for Color SSTV'ers as some can actually transmit color but not send it yet. Wish all SSTV operators would use the standard RSV code! Lots more activity on this type of SSTV contest than others. Thanks!" -N6WQ Roland Soucie

'Although I have only been in SSTV for about 6 months with very little operating time, I really enjoyed this contest! I intend on working more hours on the next one. How about a DX SSTV contest? (A5-one coming in July, see May issue). A few stations decided to "camp-out" at the 14.230 Mhz. frequency which made it hard for the rest of us. I guess that just goes to prove the 'golden rule", those that have the "gold" rule!" -KB4BT, Waynesville, NC.

A5 ATV MAGAZINE "COMMENTS"

'his contest was the best ever held in A5 history! We have learned a couple important things or success of a SSTV contest; to emphasize "quality" not quantity by giving bonus points for hings like "mugshots, color, half-speed frame, motion etc.", and to award all participants regardless of final placement. Our upcoming July "International SSTV-DX Contest" should be even etter! Let's give those "SSB-Phone" stations a taste of their own medicine (hi hi). -WBØQCD

"Congratulations Luis Chartarifsky XE1LCH of Mexico!"
(Receives Gold Certificate & 3-year sub. to A5)

DEVOTED TO HAM TV

AMATEUR TELEVISION MAGAZINE
World Wide DX SSTV Contest

This is the "big one"! Don't miss it! Our 2nd Annual International World Wide DX SSTV Contest starting at 0000Z Saturday, July 17th and ending at 2400Z Sunday, July 18th, 1982. Once again, our successful and fun operating contests have been due to the emphasis on "quality" not quantity. A 48-hour SSTV-Video Contest on 10-80 Meters within the recommended SSTV calling/operating frequencies listed below with special "bonus" points awarded to those operators who exchange "mugshots, 1/2 speed format, color, motion animation, and a new bonus qualification of quarter-framing grab and replay. Callsigns and video reports must be in "video" form, mugshots of the station operator and/or family/friends can count only once, slower clock-rate speeds are encouraged in either 128 16.5 seconds or 256 32 second time bases, color work must contain a minimum of 2-color overlay to qualify with standard RGB frame transmissions, motion SSTV must have a minimum of 2 frames sent with automatic receive switching circuitry or manually operated switching by the receving operator, and 64X64 "quadrant" storage of no less than 4 separate pictures with replays. To encourage all-band contest usage and promotion, extra bonus points are granted on the 10-15-40 and 80 meter band segments. Single and Multi-operator stations are recognized with crossband contacts not permitted. Individual contacts count only once per band with repetitive multi-band contacts acceptable. Stations over 25 DX-Countries worked add 25 points, 50 DX add 50 points over 100 DX add 100 points! Each SSTV two-way contact is worth 5 pts. (plus band and bonus multipliers) within the same country, 10 points for DX out of country. Submission of logs with totaled scores must be postmarked no later than August 1st, 1982 and submitted to: Contest Manager, A5 ATV Magazine, PO Box H, Lowden, Iowa 52255-0408. (Logs will be returned as will any photos, etc.)

Frequencies of Operation (Sug.)

	Advanced/Extra	General
80 Meters	3.845	3.990
40 Meters	7.220	7.290
20 Meters	14.230	14.340
15 Meters	21.340	21.440
10 Meters	28.680	28.680
6 Meters	50.150	50.150

Bonus Points/Multiplication Factors

Mugshots	1 point
Slow-speed	2 points
Quad-frame	3 points
Motion SSTV	4 points
High Resolution	5 points
Color SSTV (RGB)	10 points
6 Meters	times 2
10 Meters	times 2
15 Meters	times 2
40 Meters	times 3
80 Meters	times 3

AWARDS: 1st place winner receives a 3-year subscription (worth $60.00 Surface US/Canada $78.00 foreign Surface) to A5 ATV Magazine with front cover picture plus Gold Certificate, 2nd and 3rd place winners receive one-year's subscription and Gold Certificate, all entries regardless of score will receive Gold Certificate suitable for framing. Results will be in the November issue, some log-sheets and DX Country lists available from WBØQCD. Contest entry verifications audited by Ralph Wilson, WBØESF or Cedar Falls, Iowa. Good Luck!

"Promotion of this contest in QST, 73, CQ, Ham Radio and WorldRadio"

AMATEUR TELEVISION MAGAZINE

Your call

INTERNATIONAL WORLD WIDE SSTV CONTEST LOG SHEET

#	CALL	Country	QSO Date	Freq.	RSV	Band X	Bonus	Total
1								
2								
3								
4								
5								
6								
7								
8								
9								
10								
11								
12								
13								
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15								
16								
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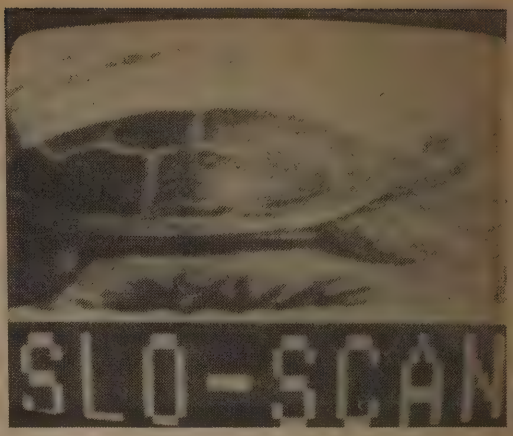
52								
53								
54								
55								
				TOTALS				

ature _____ Total Countries ___

multipliers ____ Bonus pts. _____ Final Score ____

COP MACDONALD, "Mr. SSTV," is the guy who started it all. In 1957, while a student at the University of Kentucky, he became aware that it was technically possible for hams to transmit pictures all over the world with standard h.f. gear. That year he designed the first amateur slow-scan TV system, and the next year was awarded national first prize by the AIEE (now IEEE) for a paper describing the system. During the next ten years he designed equipment, wrote articles, conducted tests, and fought for an FCC rule change to permit SSTV in the h.f. bands. In 1968 the efforts of Cop and a handful of other pioneers were rewarded when the FCC changed the rules to permit SSTV in segments of all bands from 3.5 mHz on up.



"THANKS COP"

A5 MAGAZINE'S
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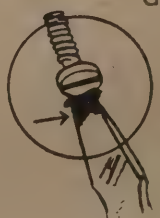

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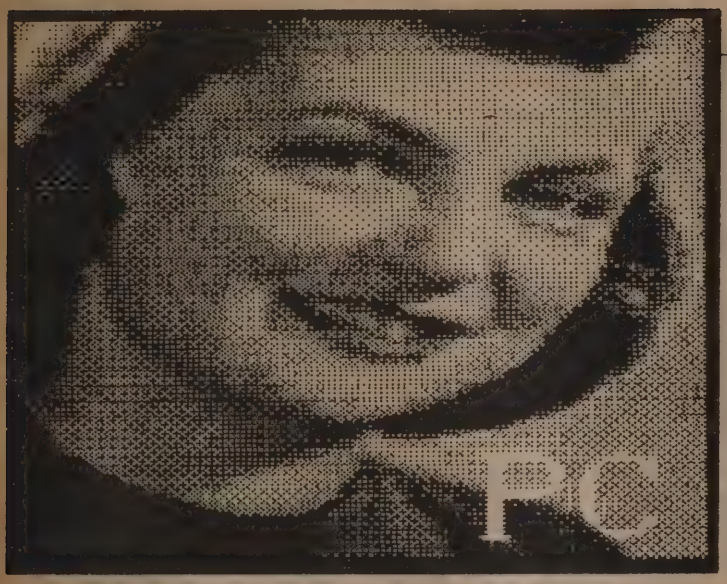

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PhotoCaster is a trademark of COMMSOFT, Inc.

With the passing of docket 80-252, there should be a surge in activity by both SSTV and FAX enthusiasts. SSTV has been around for some time now so operating parameters have been established, equipment is available, and literature and handbooks are around so those who are interested can obtain the operational theory or build their own equipment.

There has not been much interest in FAX in the past and except for several articles in the 1960's dealing with conversions of the Western Union Deskfax machines, little documentation has been available on FAX and few stations appeared on the air.

It is difficult to tell which is the older of the two; FAX or TV, but looking through some QST's from 1925, I saw an ad for a "Radio Picture" machine made by the Jenkins Company. The unit did not appear to have any electronics with it. The "below cost" amateur introductory price was about $46.00. Theses would probably be valuable collector's items if any are still in existance.

I don't know what types of FAX machines are available for amateur use today. There are some that are receive only, for copying the weather. I hope to find out the parameters of various machines from information supplied by you readers. Drop me a line and let me know what you can about various machines. We can best establish standards by knowing what equipment is out there.

I have heard from JA2OL, who is interested in FAX in Japan. The JA's are looking for FAX contacts with U.S. hams. The popular machines in use there have a drum speed of 2 rps and the picture time is about 9 minutes. They use type 3F4 emission around 14245 and 28690 KHz. Their transmissions are similar to SSTV in that black is 1500 Hz and white is 2300 Hz. They use 1500 Hz for sync also.

I feel that this type of transmission is the way to go on HF but would like to discuss if we should stick with 800 Hz shift or go to something narrower (like 170 Hz, for example). Of course equipment can have dual shift capability, but narrower shifts have several advantages that the RTTY boys recognized many years ago; more stations per given spectrum, better copy due to less selective fading, and less interference because of the narrower bandwidth.

Perhaps the best way to get introduced to FAX is to get a group of locals together on 2 meters with some of the old Deskfax units. There are probably more of these around than any others, and they are still advertised on occasion. I see them at hamfests for less than $25.00..

The 6500 Deskfax was designed around 1953 and was designed to be used in place of TTY equipment between locations where traffic was light. It was used over telephone lines all connected thru a central office. The central office furnished control and sync signals by applying various D.C. signals to the line. The central office also inverted the received signal to provide the receiving station with a positive picture. If connected directly together, these machines cannot be synchronized so the horizontal framing will be off. Also the received picture would be a negative.

When sending, the target lamp is focused to a point on the picture. The light beam is modulated by the chopper motor disc which provides the 2500 Hz carrier. The level of the tone is modulated by the rotating picture (white being the loudest tone and black being minimum level). The signal is picked up by the photocell (PC), amplified, and fed out the 600 ohm line transformer T3.

When receiving, the tone from T3 is amplified and fed to the stylus. The higher the signal amplitude, the more current the paper conducts and the darker the paper is burned.

Some basic checks should be done to the unit before any use or conversion is attempted.

INITIAL CHECKOUT:

1. Remove the top and bottom covers and visually inspect for any damage.

2 If so equipped, remove the inking device. This is a roller/felt pad assembly that is totally useless to us. It is mounted on the carriage rack with two screws.

3. Check the fuses. there is one in each lead of the AC power. Also check the #47 lamp on top of the chassis. This is the DC supply fuse.

4. Locate the buzzer, in front of the power transformer. Clip one of the leads off the buzzer.

5. Locate the LR and HR relays. They are on either side of the 12AX7 tube. Take insulated wire, string, or rubber bands and "tie" the relays in the operated position.

6. On the signal cord, connect the white and black wires together. This is signal ground. The red wire is the "hot" signal lead.

7. Rotate P1 and P2 fully counterclockwise.

8. If possible, test all the tubes.

9. If you have not done so, remove the stylus by carefully squeezing the assembly and lifting out of the holder.

10. Connect the power cord and press the Incoming (I) button.

11. The drum should rotate, The stylus motor (SM) should operate, bringing the stylus holder up to the drum, and the feed motor (FM) should move the carriage towards the left. As the unit warms up, the #47 lamp should light.

12. Up-end the unit. Measure B+ on 6V6 pin 4. It should be between 260 and 280 volts DC.

13. Measure the AC ripple at the same point. It should be less than 1 volt AC. If it is higher, the main filter capacitor (C1) will need replacing.

14. Notice that when the carriage gets to the other end, it will trip the I switch and turn off the unit.

15. Connect a pair of headphones to the signal line.

16. Place a picture on the drum.

17. Press the Outgoing switch (O). The chopper motor should rotate, the target lamp should be on, and the carriage should move again.

18. While listening in the phones, turn P2 clockwise and notice that the tone amplitude varies with the picture.

19. Press the Stop button and disconnect the power cord.

Eventually you should remove and clean the target lamp (TL) and the optics. The optic alignment should be checked anyway after modifications are complete.

With the relays blocked as they are, you can experiment on the air with the units, or connect a pair of them back-to-back and see how they work. This is the best way to get familiar with them

Modifications can be done in three parts; relay and control, amplifiers, and sync.

Deskfax Specifications

Machine size	12 x 13 x 7
Paper size	4 1/2 x 6 1/2
Drum speed	180 rpm (3 rps)
Drum motor	3600 rpm synchronous
Carrier Frequency	2500 Hz amplitude modulated
Resolution	72 lines per inch
Picture time	approx. 2 1/2 minutes
Sync time	5 to 20 seconds
Sync pulse	30 ms burst of 2500 Hz tone
Framing accuracy	plus or minus 1/4 inch

DEFINITIONS
(For modified unit only)

ACK	Audio and Transmitter control relay
BR	Motor speed control relay
CM	Chopper motor
CS	Carriage switch
DM	Drum rotating motor
FM	Carriage Feed motor
HR	Sync detector relay
I	Incoming switch
LR	Lamp relay
MS	Manual sync button
O	Outgoing switch
PC	Photocell
PH	Phasing contact
PWR	Send sync relay
S1	AC power switch
S2	Drum motor switch
S3	Receive Data switch
SD	Send data button
SM	Stylus motor
SVC	Drum motor service switch
TL	Target lamp
TR	Transmit mode relay

ノットスタイルは容易に考え、デザインすると危険です。バランスという点でノット程難しいデザインはないと思います。ワンサイド
・スリーノットにデザインしてありますが、プロフィールの美しさを最大限に印象づけることがデザインポイントといえるでしょう

この秋のファッション・ヘア〈A〉

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デザイン 山田修 モデル／シルビア

Japanese Facsimile Photo Received By PANA 2000 Unit

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XF-9B-02	USB	2.4 kHz	8	91.35
XF-9B-10	SSB	2.4 kHz	10	119.65
XF-9C	AM	3.75 kHz	8	73.70
XF-9D	AM	5.0 kHz	8	73.70
XF-9E	FM	12.0 kHz	8	73.70
XF-9M	CW	500 Hz	4	51.55
XF-9NB	CW	500 Hz	8	91.35
XF-9P	CW	250 Hz	8	124.95
XF910	IF noise	15 kHz	2	16.35

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ANSWERS TO OFTEN-ASKE

"WHY WORK RTTY?"

RTTY is one of those quickly growing "specialized" forms of amateur communications. The attraction to its devotees is probably a mixture of the magic of modern digital communications coupled with the convenience of written rather than coded or voice communications. If you participate in the popular autostart nets, it's not even necessary to be home when receiving a RTTY message—the printer or display will record the text for you to read at your convenience. RTTY is very popular among "rag-chewers" and "engineers" alike, in fact, you get to do a bit of both. The rapid growth of digital electronics has carried over to both RTTY and the new home computer hobby. ASCII communications between ham computers lacks only final FCC approval. If your "bag" is chasing DX, what could be more satisfying than a DXCC certificate for all RTTY? There are several DX RTTY contests sponsored every year with heavy participation. So, rather than ask "Why?", ask "How?"

"WHAT DO I NEED TO WORK RTTY?"

A ham RTTY station needs a transmitter, receiver, and antenna just like any RF communications system, in addition to some "special boxes" to make the RTTY part work. Some considerations for the equipment are outlined below:

1. RECEIVER - TRANSMITTER

   The RTTY receiver and transmitter (or transceiver) should be stable, well calibrated, and capable of *EXTENDED TRANSMITTER OPERATION*. When you are transmitting RTTY, the full carrier is on for longer periods of time than for CW or SSB voice. So, check your manual and manufacturer for RTTY specifications and, if in doubt, reduce transmitter power somewhat. For HF work, a good SSB rig in LSB mode works well with RTTY tones (more on tones, later). Most VHF-FM transmitters work with RTTY, but avoid overloading the transmitter as mentioned above.

2. ANTENNA

   A good antenna will buy you the same benefits in RTTY as it does in other modes. One caution though, the traps on some antennas may not handle as much power in continuous RTTY operation as they do for CW or SSB voice. This can especially be true of trap vagi antennas for the HF bands.

3. RTTY DEMODULATOR

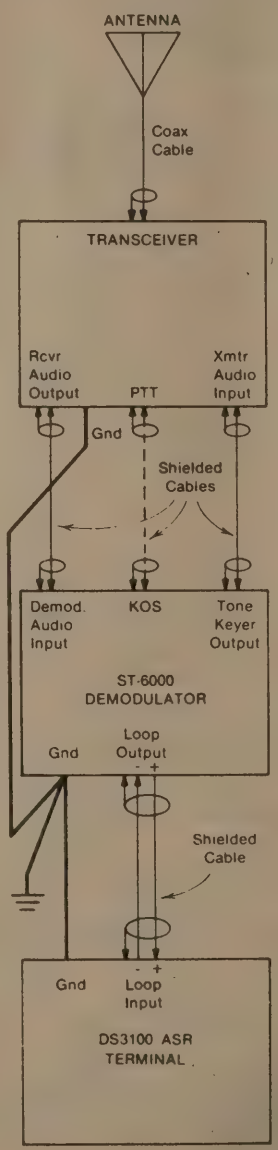
   The demodulator connects to the receiver audio output and converts the RTTY tones to keying pulses. The quality of your printed signal is determined more by demodulator performance than by any other portion of the system. Demodulators come in all shapes, sizes, and prices. HAL offers the feature-packed ST-6000 with active filters, scope, autostart, anti-space, ATC, DTH, and KOS, as well as the lower cost ST-5000. The popular ST-5 and ST-6 parts kits are also still available for the skilled technician.

4. TONE KEYER

   The tone keyer circuitry converts the keying pulses from your keyboard into audio tones to drive the transmitter. Since this circuitry is closely related to that of the demodulator, both are supplied in the same cabinet in all HAL demodulators.

5. TERMINAL

   The terminal is the device that prints or displays the received signals while allowing you to type your transmitted message. The terminal is sometimes divided into a keyboard and a printer or display section. The terminal can be as simple as an old surplus TTY machine or as exotic as the microprocessor controlled HAL DS3100 ASR terminal. An important feature of HAL Communications terminals is that ALL HAL RTTY EQUIPMENT IS LOOP COMPATIBLE WITH TTY MACHINES. This means that you can add HAL electronic equipment to your RTTY system at any time. The advantages of the HAL electronic terminals are many; ranging from lack of noise and oil (keeps the XYL happy and your nerves soothed) to automatic operator features such as real-time editing of typing errors, programmable identification message, and automatic carriage return/line feed operations. Also, the speed of the electronic terminal is easily changed with a front-panel switch. Machines require an expensive gear box or a manual change of gears to change speed. HAL offers the DS3100 ASR, DS2050, and CT2100. All HAL terminals operate with the standard ASCII computer code as well as with the normal amateur BAUDOT code.



"HOW DO I HOOK IT UP?"

Probably the most frightening thing to the RTTY beginner is the thought of all those wires that must be connected to make it work. A particularly complicated RTTY station can have a real "rats-nest" of wires, but it didn't start that way. Make connections in a logical and step-by-step manner and all will work well. All transceivers are slightly different, but, in general, you will have to make these connections:

1. GROUNDING

   Before making any other connections, decide approximately where your equipment will be located and run short, low-inductance ground wires (shield braid recommended) between the cabinet grounds of all equipment AND MACHINES. Do not defeat the AC safety ground on the HAL power cords; run separate RF grounds in addition to the AC safety ground. *LACK OF ADEQUATE RF AND SAFETY GROUNDS CAUSES MORE PROBLEMS IN RTTY INSTALLATION THAN ANY OTHER SOURCE.*

2. RECEIVER TO DEMODULATOR

   Use shielded cable to connect a 500 ohm audio output of the receiver to the demodulator audio input jack. If you do not have a 500 ohm output, the 4-8 ohm speaker output will work, but not as well; a speaker to 500 ohm line transformer would be a good part to add when possible.

3. TONE KEYER TO TRANSMITTER

   Use shielded cable to connect the tone keyer output of the demodulator to the transmitter audio input. Often, a rear-panel "phone-patch" or "auxiliary" input is provided. If not, connect directly to the microphone connector.

4. DEMODULATOR TO TERMINAL

   Use shielded cable to connect the terminal to the demodulator. Use the current loop connection for each. When connecting to a solid-state terminal, be sure to observe the proper polarity as indicated in the operator's manuals. Be extremely careful when wiring the loop circuit—potentially lethal voltages are present when the equipment is turned on (200 VDC @ 60 ma). Also, be sure that no part of the loop circuit is connected to chassis ground in machines or other equipment. All RTTY equipment is connected in series when the current loop output is used.

5. CONTROL CIRCUITS

   Since the control requirements differ with manufacturer, study your transceiver manual carefully to determine how to control the transmit-receiver function. Usually, you can control the push-to-talk (PTT) line through a pin on the microphone connector, a front panel switch, or a rear panel accessory connector. Initially, try to manually switch between transmit and receive until you are familiar with RTTY operation. Eventually, you will probably want to take advantage of the automatic Keyboard Operated Switch (KOS) feature of the DS3100 ASR and ST-6000. KOS is the RTTY equivalent to VOX; typing on the keyboard puts you into transmit mode. If you pause long enough, the KOS "drops-out" putting you back into receive mode. KOS is particularly convenient for short exchanges.

With the CT2100 and DS2050, since the demodulator and terminal are combined in the same package, the hookup is much simpler. The only cables are audio to and from the transceiver, ground, and KOS to PTT connections.

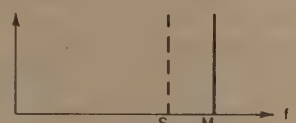
"WHAT IS THIS MARK AND SPACE BUSINESS?"

The RTTY signal from the terminal is a series of pulses. The amateur BAUDOT RTTY signal has 7 possible pulses for each character typed or printed, each transmitted one-after-another (serial). Each pulse can be either "ON" (current flow in the RTTY loop) which is called "MARK" or "OFF" (no current flow), the "SPACE" condition. To keep decoders synchronized, the first pulse of a character, the START pulse, is always a SPACE (current off); the last pulse, the STOP pulse, is always a MARK (current on). The 2nd through the 6th pulses can be either MARK or SPACE, depending upon the coding required for a character. The START and all 5 data pulses are the same length; the STOP pulse may be either equal to or longer than the others. The so-called computer ASCII code uses START and STOP pulses but has eight instead of five intermediate data pulses, thus allowing a greater number of characters to be encoded. Although all machines and HAL electronic terminals use pulses, the MARK and SPACE pulse conditions are converted into MARK and SPACE audio tones for easy radio transmission.

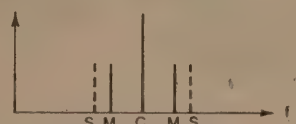
QUESTIONS ABOUT RTTY

"WHAT IS THE DIFFERENCE BETWEEN FSK AND AFSK?"

Transmitting RTTY signals via radio could be done like Morse code with on-off keying of the transmitter carrier. However, the interference received during off-times would give badly distorted printout. Rather, HF RTTY is transmitted with Frequency Shift Keying (FSK) so that the mark pulse condition corresponds to one radio frequency and the space to another. Amateur radio convention has it that the mark radio frequency is higher than space and that the separation or "shift" of the signal is standardized at 170 Hz or 850 Hz. (425 Hz shift is also used by commercial RTTY stations.) Most present-day amateur RTTY stations use 170 Hz shift exclusively. The FSK signal is received with the BFO turned on, giving two audio frequency tones for the mark and space conditions. The audio tones are, in turn, detected in the demodulator and the resulting pulses drive the display or printer. Note that changing the transmitter or receiver frequency (on purpose or through frequency drift) will change the audio output frequency to the demodulator. The HF system is therefore quite drift sensitive. Present HF equipment frequency stabilities are quite adequate for FSK RTTY, but it is only very recently that VHF equipment was available with similar stability. Therefore, VHF RTTY has traditionally been transmitted by first keying audio tones with the RTTY pulses and then using these tones as the audio modulation of an AM or FM VHF transmitter. This is called AFSK for Audio Frequency Shift Keying. Current amateur convention is to make the mark audio frequency lower than the space frequency by the amount of the shift. Since the RTTY data is audio modulation of the carrier, frequency drift of either transmitter or receiver is a lot less critical. The audio frequency of the tones transmitted is set to be the same as those in the receive demodulator.

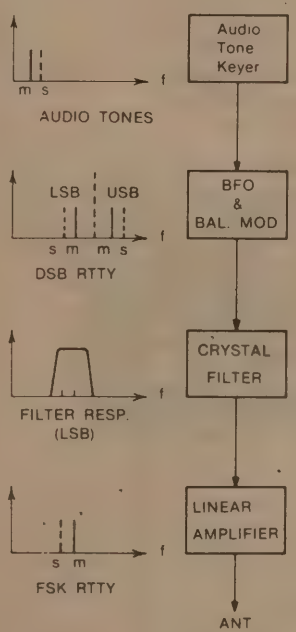


FSK RTTY



AFSK RTTY (AM)

The required radio frequency shift keying can be done in two different ways: shift the frequency of a transmitter oscillator directly with the RTTY pulses or use a SSB transmitter with audio tones. Direct FSK keying circuits are described in most amateur journals and are generally simple, but require modification of the equipment; generation of FSK with a SSB transmitter is as follows: If a Lower Sideband Transmitter (LSB) is driven with a 2125 Hz audio tone, the RF output of the transmitter will be at a frequency 2125 Hz *BELOW* the suppressed carrier frequency. A properly adjusted LSB transmitter will have *NO OTHER* output frequencies. If the input tone is changed to 2295 Hz (170 Hz shift), the RF frequency is now 2295 Hz BELOW the carrier frequency. Thus, audio tones into the LSB transmitter have produced FSK carriers out of the transmitter. Note that, because the LSB mode was used, the 2125 Hz standard mark tone for VHF AFSK has become the higher radio frequency. Thus, the same demodulator and tone keyer can be used for both VHF AFSK and HF FSK operation. Often, this use of audio tones with a SSB transmitter is mistakenly called "HF AFSK"—actually the resulting output is true FSK, IF the SSB transmitter has no spurious outputs (such as carrier or unwanted side-band). Most HF RTTY amateur radio stations use audio tones with a SSB transmitter. Although "standard" audio tones for VHF amateur operation have long been 2125 Hz for mark and 2975 Hz for space (850 Hz shift), limited audio frequency response of HF SSB transmitters and receivers has recently given rise to a second set of "standard" tones at lower frequencies ("Low-tones")



"HOW ABOUT HIGH- VS LOW-TONES?"

Historically, demodulator tones were set to 2125 Hz for mark and 2975 Hz for space reception of 850 Hz shift. When transmitter stability improved, 170 Hz shift was used and the space frequency changed to 2295 Hz (mark remained at 2125 Hz). These three tones were, and still are, a standard for U.S. Amateur RTTY. However, in the early 1960's, virtually all commercially available transmitters and receivers became filter-type SSB equipment with audio pass-band limited to speech frequencies, sometimes as narrow as 2.1 kHz (300 to 2400 Hz). Obviously, the 2975 Hz (850 Hz shift Space) tone will not pass-through such a filter and 850 Hz shift with these tones is not possible (although the 170 Hz shift is). Therefore, either the SSB equipment must be modified or different, lower-frequency tones must be used if 850 Hz RTTY shift is desired. Both approaches have their advantages and both are currently in use. The so-called "LOW-TONE" standard sets mark at 1275 Hz and space at 1445 Hz (170 Hz shift) or 2125 Hz (850 Hz shift), conforming to the European IARU standard. So, there are now two sets of "standard" tones, LOW and HIGH (as well as a myriad of others), all of which work *INTERCHANGEABLY* on HF RTTY. However, since the actual audio tone is transmitted for VHF AFSK operation, the two sets are *NOT COMPATIBLE IN VHF AFSK* applications. Current U.S. Amateur operation uses the HIGH TONES for VHF. Thus, to use a demodulator and keyer for both HF and VHF operation, it should be set-up for HIGH-TONE operation. Conversely, you may wish to have separate stations for HF and VHF, simplifying the cabeling, and providing simultaneous monitor/operation capability, as well as resolving the tone problem. The HAL ST-6000 and ST-5000 Demodulators are available for either HIGH or LOW-TONE operation

"WHAT FREQUENCIES DO I USE FOR RTTY?"

HF RTTY Operation has evolved to heavy operation on the 80 and 20 meter bands (CW segments) with sporadic operation on other HF bands. 80 meter RTTY stations tend to operate between 3600 and 3650 kHz and 20 meter stations between 14.075 and 14.100 MHz. 170 Hz shift is used almost exclusively with mark being the higher radio frequency. 60 wpm (45 baud) is the most popular RTTY speed, but 100 wpm (74 baud) is gaining in popularity.

VHF RTTY operation in most areas is concentrated on 2 meter FM with 146.700 MHz being the popular operating frequency. Virtually all stations are now using the "High-tones," usually with 170 Hz shift. As with HF RTTY, 60 wpm (45 baud) is most popular on VHF. Some areas now have RTTY-only repeaters on 146.10/146.70 MHz.

"WHO DO I TALK TO ON RTTY?"

RTTY enthusiasts run the full range of ages and interests, but tend to be technically inclined. The typical RTTY'er is always modifying his station, likes to talk, and usually has more ideas than you have printer paper (or display screen)! Some operators are good typists; most aren't. The DS3100 ASR letters-fill and editing modes make even a poor typist look good. Recently, the home computer hobby has become quite popular with RTTY people and you may find a lot of help in debugging your programs if that's your interest. There are an increasing number of DX stations on RTTY.

"HOW MUCH DOES IT COST?"

RTTY is like any other hobby—it can cost as much or as little as you want it to. If you buy used machines and build kits or your own designs, the total RTTY cost can be quite low. Conversely, the DS3100 ASR and ST-6000 offer an *ULTIMATE* RTTY station that is expensive. Because all of the HAL RTTY products are current loop compatible, you can add devices as your interests (and pocketbook) indicate. For the beginner, HAL has the following recommendations:

1. DEMODULATOR

   Assuming you already have a good transceiver and antenna, your first major RTTY purchase should be a good demodulator. The HAL ST-5000 makes a particularly good, cost-effective unit. If you select a high-tone ST-5000, it will be usable for either VHF or HF (170 Shift) RTTY operation; if you are only interested in HF RTTY (for short-wave-listening to press stations, for example), the low-tone unit may be a better choice. Conversely, you may wish to "jump-in" and get the ST-6000 from the first. Either way, put high priority on a *GOOD* demodulator.

2. TERMINAL

   You can spend very little or a lot on the terminal. A surplus machine can often be acquired at a hamfest for little cash investment. However, by the time you figure out how it works, fix it, and buy parts and manuals the total cost may not be so low. If you do, you'd better be prepared with tools, oil, and patience. Newer machines require less work, but also cost more. On a feature-for-feature basis, either the DS2050 KSR, CT2100, or DS3100 ASR are more cost effective than other terminals presently available. Certainly a "solid" beginner's RTTY station would be the DS2050 KSR with a video monitor. For the more serious enthusiast, HAL offers the CT2100 or DS3100 ASR.

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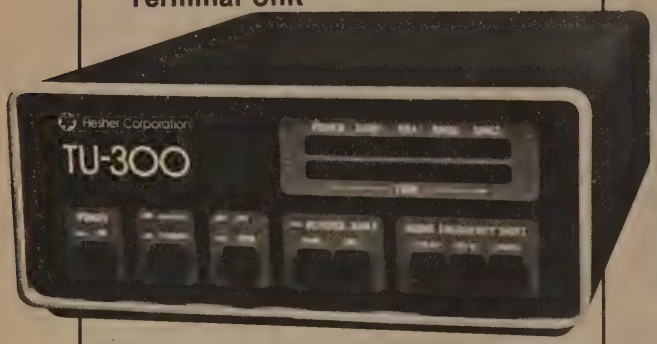

Capable of communication rates to 300 baud, the TU-300 is designed specifically for modern high-speed and standard RTTY applications. The TU-300 operates with standard microcomputer, TTY and radio equipment and is TTL and RS 232-C compatible. Controllable by remote, this next generation terminal unit with innvoative modular design provides more than six times the conventional amateur data transmission rate using present radio and computer equipment. Featuring three frequency shifts, the TU-300 is the only 300 baud terminal unit offered in easy to construct kit or wired.

TU-170
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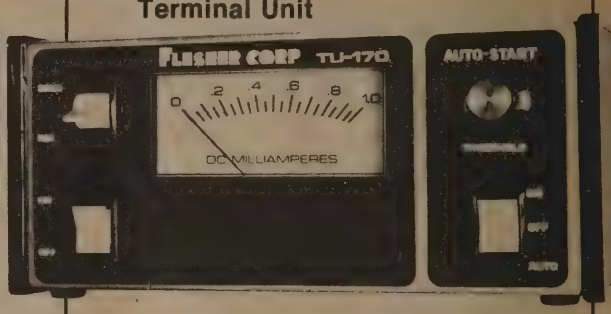

Ideal for HF and VHF autostart operation, the TU-170 is all you need to connect transceiver and teletype or computer. A simple 4 wire connection provides easy installation that gets you on the air in minutes.
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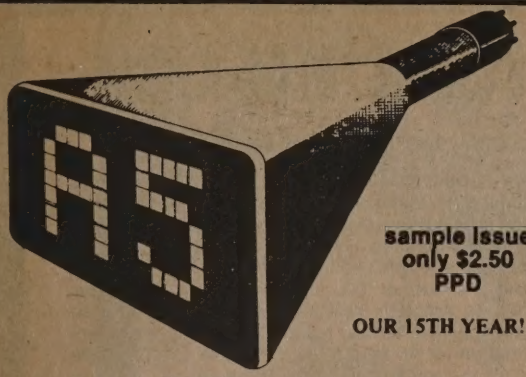

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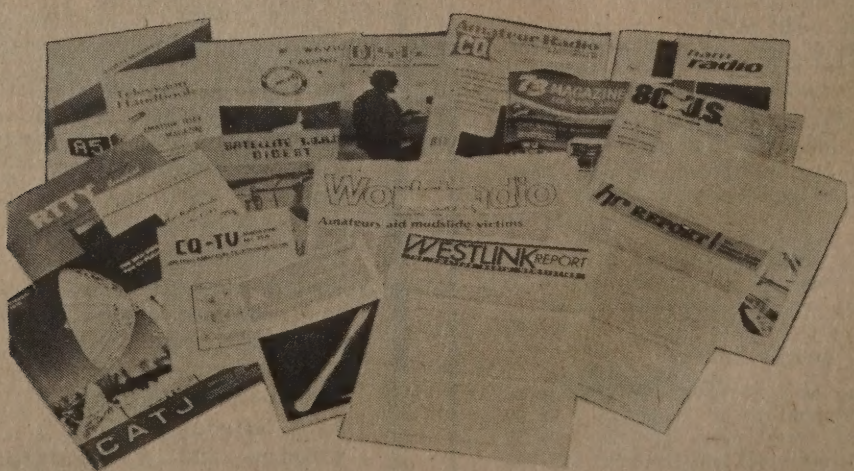

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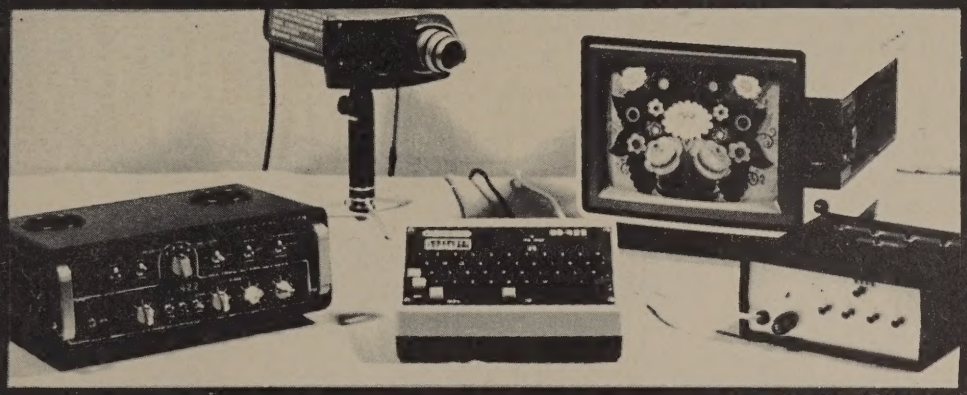

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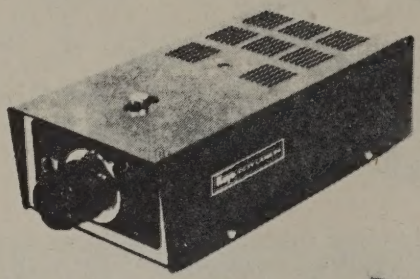

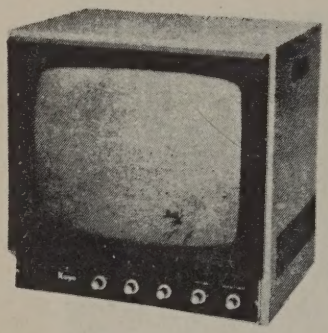

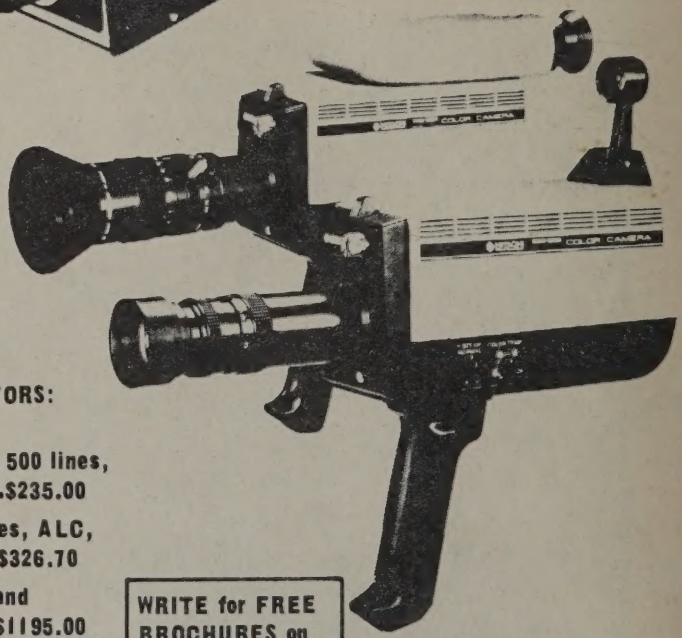

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